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Mémoires

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MEMOIRS

RELATIVE TO

EGYPT,

WRITTEN IN THAT COUNTRY DURING THE

CAMPAIGNS

OF

GENERAL BONAPARTE,

In the Years 1798 *and* 1799,

BY

THE LEARNED AND SCIENTIFIC MEN

WHO ACCOMPANIED

THE FRENCH EXPEDITION.

Published in Paris by Authority.

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OF THE TRANSLATOR.

WHEN the ever-memorable expedition of the French againſt Egypt was committed to the care of General Bonaparte, it is well known that he perſuaded a number of men of learning and ſcience to accompany him, many of whom had been eminent in France for their talents and induſtry.

The Work which is here preſented to the Public is a faithful tranſlation of the Memoirs and Obſervations of thoſe perſons. It conſiſts of a number of papers on various topics, which were brought from Egypt by General Bonaparte, preſented by him to the National Inſtitute, and lately ſelected, arranged, and publiſhed by that learned and diſtinguiſhed Body.

The reader will naturally expect to find conſiderable information concerning the manners, cuſtoms, arts, and natural productions of the curious and intereſting country to which theſe papers relate. In this expectation, he will not be diſappointed. Allowing for the great difficulties which attend the collecting of ſcientific information in a country where every progreſs was made in a hoſtile manner, and which, though ſo much celebrated in hiſtory,

has

has long been in a ſtate of very imperfect civilization, theſe ſcientific Memoirs will be found to contain a variety of matter highly intereſting to the lovers of philoſophical knowledge, and which will materially aſſiſt the labours of thoſe who may chooſe to examine into the characteriſtic diſtinctions of the ſingular people who occupy this remarkable portion of the globe.

Some of the Memoirs bear the marks of being haſtily compoſed, but theſe form by no means a large portion of the preſent Work; and as it is underſtood that the French original is a ſelection of the Memoirs which were judged the moſt worthy of publication, no omiſſions or alterations have been made by the Engliſh Editor, which might render the tranſlation any thing elſe than an accurate and complete copy of the original Work.

London,
March 31*ſt*, 1800.

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N. B. The notes ſigned (L—s) are by Citizen Langles, Member of the National Inſtitute of France, and Keeper of the Original Manuſcripts in the National Library.

☞ *The Binder is requeſted to place the Chart of the Lake of Menzaleh oppoſite the Title, and the Map of the Natron Lakes oppoſite page* 270.

MEMOIRS

MEMOIRS

RELATIVE TO

EGYPT.

FORMATION OF THE INSTITUTE OF EGYPT.

BONAPARTE, the commander in chief, by a ſpecial order, dated the 3d Fructidor, 6th year (20th Auguſt, 1798), enjoined, that an Inſtitute ſhould be formed at Cairo, for the cultivation of Arts and Sciences. It is intended that this eſtabliſhment ſhall be principally occupied:

1°. With the propagation and progreſs of knowledge throughout Egypt; and

2°. With an enquiry into, the ſtudy, and the communication of natural, economical, and hiſtorical facts relative to that country.

The Egyptian Inſtitute is divided into four ſections, which are thoſe of Mathematics, Natural Philoſophy, Literature and the Fine Arts, and Political Economy. Each ſection is compoſed of twelve members; that of Mathematics, is the only one at preſent complete. There are two places vacant in the department of Natural

Philoſophy; ſix in that of Political Economy; and four in that of Literature and the Fine Arts.

Liſt of Members of the Inſtitute.

MATHEMATICS.

Andreoſſi,	Leroi,
Bonaparte,	Malus,
Coſtaz,	Monge,
Fourier,	Nouet,
Girard,	Queſnot,
Le Pere,	Say.*

NATURAL PHILOSOPHY.

Berthollet,	Deſgenettes,
Champy,	Dolomieu,
Conté,	Dubois,†
Delille,	Geoffroy,
Deſcotils,	Savigny.

POLITICAL ECONOMY.

Caffarelli,‡	Shulkouſki,
Gloutier,	Sucy,§
Pouſſielgue,	Tallien.

* He was ſucceeded by the Citizen Lancret.

† He has retired, and is ſucceeded by the citizen Larrey.

‡ Replaced by the citizen Corancez.

§ Retired, and replaced by the citizen Fauvelet Bourrienne.

LITERA-

LITERATURE AND THE ARTS.

Denon,	D. Raphael,
Dutertre,	Redouté,
Norry,	Rigel,
Parſeval,	Venture.*

SUMMARY OF THE PROCEEDINGS AND LABOURS OF THE INSTITUTE.

The Inſtitute of Egypt met for the firſt time on the 6th Fructidor (23d Auguſt); it will continue to aſſemble on the *primidi* and *ſextidi* (firſt and ſixth days) of every decade. Citizen Monge was elected Preſident, and citizen Bonaparte, Vice-preſident, for the enſuing quarter; citizen Fourier was nominated perpetual Secretary.

Citizen Bonaparte then propoſed the following queſtions:

1°. Are the ovens employed in baking bread for the army, ſuſceptible of any improvements, in regard to the expenditure of fuel, and in what do theſe improvements conſiſt? The examination of this queſtion was referred to a committee compoſed of the citizens Berthollet, Caffarelli, Monge, and Say.

* Replaced by citizen Ripault.

2°. Are there any indigenous means of ſubſtituting another ingredient inſtead of hops, in the beer made in Egypt? Referred to a committee compoſed of the citizens Berthollet, Coſtaz, Deſgenettes, and Gloutier.

3°. What are the modes uſually employed for clarifying and dulcifying the waters of the Nile? Referred to a committee compoſed of the citizens Berthollet, Coſtaz, Monge, and Venture.

4°. Conſidering the preſent ſtate of affairs at Cairo, which ought to be conſtructed, a wind or a water mill? Referred to a committee conſiſting of the citizens Andreoſſy, Caffarelli, Coſtaz, Malus and Say.

5°. Does Egypt furniſh reſources for the fabrication of gunpowder, and what are thoſe reſources? Referred to a committee compoſed of the citizens Andreoſſy, Berthollet, Malus, Monge, and Venture.

6°. What is the preſent ſtate of juriſprudence, of the judicial order, both civil and criminal, and alſo of education in Egypt? What are the improvements that can be introduced into theſe branches, and are at the ſame time deſired by the people of the country? The committee entruſted with collecting the neceſſary information on theſe various ſubjects, was compoſed of the citizens

citizens Coſtaz, Shulkouſki, Suci, and Tallien. A committee, conſiſting of the citizens Caffarelli, Coſtaz, Geoffroy, Monge, and Tallien, was afterwards appointed: it was charged with propoſing a plan of regulations for the Inſtitute.

In the ſeſſion of the 11th Fructidor, citizen Andreoſſy delivered a report relative to the fabrication of gunpowder in Egypt, and Citizen Monge read a memoir on the optical phenomenon, called *mirage*,* by the French ſailors.

A committee was afterwards appointed, to draw up comparative tables of the weights and meaſures of Egypt, and thoſe of France: it was compoſed of the citizens Coſtaz, Geoffroy, and Malus. Another was enjoined to make preparations for facilitating the compoſition of an Arabian vocabulary, to enable the French to keep up the neceſſary communications with the inhabitants of Egypt: this conſiſted of the citizens, Deſgenettes, Shulkouſki, and Tallien.

The citizen Monge, on the 16th Fructidor, exhibited to the aſſemby a ſpecimen of the ſtone with which the caſtle of Cairo had been built; it was cut out of the rock on which the fortifications now ſtand. This calcarcous ſtone is com-

* This is uſually denominated a *fog-bank* by the Engliſh navigators, and is very common in the warm latitudes. *Tr.*

poſed of what is commonly called the *nummiſmatical ſhell*, becauſe it reſembles little pieces of money. Theſe ſhells ſplit with great facility, if taken longitudinally; within is found a very thin ſubſtance, diſpoſed in a ſpiral form; it ſerves as a lodging to the animal that forms it. A ſtone in every reſpect ſimilar to this is found at Laon, the principal town of the department of the Aiſne, where it has been employed in building. One would think that he ſaw the walls of that place, when he beholds the ruins of the caſtle of Cairo.

Citizen Berthollet read a memoir on the formation of ammoniac; he explained the nature of the precipitate that reſults from the diſſolution of tin, in conſequence of the mixture of the muriatic with the nitric acid. This precipitate is not, as has been hitherto ſuppoſed, an indiſſoluble oxyd of tin, but a combination of tin, highly oxydated with the ammoniac. The tin, between which and oxygene there is a great affinity, decompoſes the nitric acid and the water, and then the azote and hydrogene unite together to produce the ammoniac. The laſt ſubſtance combines with the oxyd of tin, and forms the precipitate we have juſt mentioned.

This explanation is ſupported by the follow-

ing

ing experiments :—the ammoniac is withdrawn from this precipitate by the action of heat and the admixture of lime. The diſſolution of tin in the muriatic acid, even when impregnated with the oxygenated muriatic acid, does not then afford any precipitate ; but this is formed the moment that a little ammoniac is poured in. The muriatic diſſolution of tin, to which is added the oxygenated muriatic of potaſh, preſerves it without being ſubject to turn thick, even when it is expoſed to heat.

It is highly important in the art of dying to be able to keep the diſſolution of tin without its either getting foul, or the oxyd of tin ſettling at the bottom, by means of precipitation. It has been propoſed that it ſhould be prepared with the muriatic acid alone, and that the dyer ſhould impregnate it with the oxygenated muriatic acid during each operation ; but, inſtead of this embarraſſing impregnation, which is attended with great uncertainty in reſpect to the proportions, citizen Berthollet propoſes to add a determinate quantity of the oxygenated muriatic of potaſh, by means of which, tin highly oxydated, ceaſes to ſolicit the decompoſition of water, and conſequently the formation of ammoniac ; ſo that the diſſolution is thus preſerved in an uniform ſtate.

He announces, that ſeveral other metallic precipitates are alſo indebted for their diſtinctive properties, to the ammoniac which has formed itſelf, and remains in combination with them.

In the ſeſſion of the laſt Fructidor, citizen Shulkouſki informed his colleagues, that he had obſerved a buſt of Iſis on the banks of the Nile, near Feraneh, and two ſtones inſcribed with hieroglyphics in a garden of the ſame village; he requeſted that they might be tranſported to Cairo, and placed within the buildings occupied by the Inſtitute.

Citizen Say read a note containing the reſult of a comparative experiment with wood, reed, and the ſtalk of the carthamus (*carthamus tinctorius*, Lin.) for the purpoſe of heating ovens. This note alſo exhibited the advantages and diſadvantages of each of theſe three cumbuſtibles, as well in reſpect to the duration, as to the degree of heat produced by the conſumption of a determinate quantity.

The committee for perfecting the grinding of corn, informed the aſſembly that the arrival of ſeveral mechanics attached to the commiſſion of arts, would facilitate the conſtruction of a wind-mill.

Citizen Geoffory read a memoir on the wing of the

the oſtrich, and citizen Beauchamp was nominated a member of the Inſtitute in the ſection of Natural Hiſtory.

On the 20th Fructidor, citizen Say, in the name of a committee, preſented a report relative to the moſt advantageous ſpecies of fuel for the ovens of the army, and alſo on the means of leſſening its conſumption. It reſults from this, that the ſtalks of the carthamus, reeds, and the ſtraw of Indian corn, can furniſh a ſufficient quantity of cumbuſtibles for the ovens, and that too at a leſs price than in France; the difference may be eſtimated at 20 *per cent.* The conſtruction of the ovens, care in the manner of heating them, and the rapid ſucceſſion of batches, will diminiſh the quantum required; in addition to theſe means, new ovens may be built, in which the current of air ſhall be more rapid than in thoſe now in uſe.

Citizen Bonaparte laid on the table a copy of " the Meteorological Regiſter for the 7th year;" he at the ſame time invited the Inſtitute to take the neceſſary meaſures for drawing up an almanack. The citizens Beauchamp, Monge, Nouet, and D. Raphael, were intruſted with the completion of it. This triple calendar is to comprehend the diviſion of time, according to the

the different modes adopted by the French, the Cophts, and the Muſſulmen.

Citizen Fourier read a memorial on the general reſolution of algebraical equations.

Citizen Parſeval recited a tranſlation of a fragment of the ſeventeenth *canto* of Taſſo.

The citizen Deſgenettes addreſſed the aſſembly relative to the ſalubrity of Egypt; he began by enumerating the diviſions of the year, according to Proſper Alpinus. That phyſician diſtinguiſhes four ſeaſons occurring at different periods from thoſe in Europe: the ſpring, which is compoſed of the months of January and February; the ſummer, which continues ſix months, and is divided into two diſtinct portions, of which March, April, and May, conſtitute the one, and June, July, and Auguſt, the other. The autumn, conſiſts of September and October; the winter, of November and December. Citizen Deſgenettes briefly enumerated the maladies peculiar to each of theſe ſeaſons; he remarked that the army, during the laſt ſummer, had in general experienced only three diſeaſes, the ophthalmy, the diarrhœa, and the dyſentery, relative to which he delivered a number of obſervations which he means to publiſh. He aſſigns as the predominant cauſe of theſe maladies,

dies, eſpecially the two laſt, the frequent changes of the atmoſphere; he has accordingly invariably directed towards this point, the advice given by him in the various orders of the day. Repeated obſervations have in fact demonſtrated that in nearly all diſeaſes, there is a general tendency to carry the humour which conſtitutes tranſpiration from within towards the ſurface; that is to ſay, from the inteſtines to the ſkin. This remark ſhews with how much circumſpection all violent or draſtic purgatives ought to be avoided, and the advantages reſulting from the employment of the *minoratives*, when evacuation, becomes neceſſary. The ancients have long ſince recommended ſlight purgatives, whenever there was any danger of diminiſhing the tranſpiration, and Sanctorius hath ſince demonſtrated by his ſtatical experiments, that the adminiſtration of theſe means, ſcarcely produces ſenſible evacuations. It has alſo been remarked, that mercurial preparations taken internally, and external frictions, even when methodically adminiſtered, far from producing ſalutary effects, have often proved greatly detrimental, in the treatment of venereal maladies, ſo that it became neceſſary to recur to ſudorifics for a cure.

Citizen Deſgenettes afterwards alluded to the preſent

preſent medical epoch of the year, the paſſage from ſummer to autumn, being that which is the moſt critical in Europe; but he thinks, that it may not perhaps prove equally deleterious in this climate, as the autumn is very ſhort, and already announces itſelf as little elſe than a continuation of ſummer. The maladies to be dreaded in autumn, are fevers, eſpecially intermittent ones; and the latter, which are rather dangerous, are generally ſuppoſed to be indebted for their exiſtence, to the neighbourhood of marſhes; but the rapid manner in which the Nile retreats, and that, by means of which the earth is all of a ſudden covered with an abundant vegetation, ought to render us eaſy in regard to this particular: the ſoil we inhabit has no affinity whatever to a marſh.

The phyſician whoſe diſcourſe we here analyze, concluded by a reference to that redoubtable malady, which already excites the ſolicitude of government, and announced, that notwithſtanding his repeated enquiries, he was as yet unable to obtain a ſatisfactory history of it. He has however perceived, that in this country they generally confound all peſtilential fevers which are exceedingly various, and form a genus of themſelves, with the plague properly ſo called, which is a very

circum-

circumſcribed ſpecies. Future obſervations, muſt decide this queſtion.

During the ſeſſion of the firſt complimentary day, of the year 6, (September 17, 1798) Citizen Beauchamp preſented an abridged calendar capable of being inſtantly printed for the uſe of the army. This contains both the old and new diviſion of time.

Citizen Berthollet enumerated the modes practiſed at preſent in Egypt for the manufacture of indigo; they are extremely ſimple but imperfect. It will however be eaſy, by means of a few changes to improve the fabrication of this important production.

Citizen Fourier read the deſcription of a machine, worked entirely by the wind, and capable of being employed for watering the ground. The wheel expoſed to the action of this element is horizontal; all the other parts are ſtationary, and the ſails ſo placed, that they always turn round in the ſame manner, whatever may be the direction of the current of air.

The members did not aſſemble, on the firſt *Vendemiaire*, 7th year, (September 22d, 1798) on account of the celebration of the feſtival in honor of the anniverſary of the foundation of the Republic.

On

On the 6th, citizen Pouſſielgue preſented a printed work by citizen Corancez, the title of which was, "A ſummary of a new method, for reducing the principal theorems of geometry, to a ſimple analytical proceſs." The Inſtitute gave orders, that this work ſhould be depoſited in its library.

Citizen Norry read a memoir on Pompey's column. In conſequence of this paper, citizen Dolomieu delivered his opinion relative to the epoch of its erection, which according to him, ought to be referred to the age, that follows the reign of Conſtantine. The capital and pedeſtal, exhibit the marks of decay, viſible in the architecture of thoſe times; but the ſhaft muſt appertain to an anterior epoch, when this art flouriſhed in all its purity.

Citizen Savigny read a memoir relative to a new ſpecies of *nymphæa*.

Citizen Dutertre preſented a paper on the eſtabliſhment of a public ſchool for drawing. His propoſition was referred to the examination of a committee, compoſed of the citizens Denon, Deſgenettes, Norry, Redoute, Rigo, and Sucy.

Citizen Coſtaz read a memoir, in which he explained the variations of the colour of the ſea.

Citizen Parſeval recited a tranſlation in verſe,

of

of a fragment of the ſeventeenth canto of *Jeruſalem Delivered.* On the 4th *Vendemaire,* the Preſident made an offer in the name of General of Brigade Beliard, of twenty mummies of birds, preſerved in pots of free-ſtone, ſealed up. The examination was referred to a committee compoſed of the citizens Bonaparte, Deſgenettes, Dolomieu, Dutertre, Geoffroy, and Sucy.

Citizen Porte, a Frenchman ſettled at Cairo before the arrival of the army, and who has been occupied ever ſince, about the cultivation and manufacture of indigo, preſented a ſpecimen of the produce. A committee compoſed of the citizens Berthollet, Coſtaz, and Deſcotels, was nominated to deliver in a report upon this ſubject.

A member of the Inſtitute read a memoir on the ophthalmy,* drawn up by Citizen Larrey.

The Citizen Beauchamp delivered a narrative of his voyage from Conſtantinople to Trebiſond. It is well known that Bonne aſſigns a very different poſition to the Caſpian Sea, from that which we find in Danville's maps. He, indeed, preſerves the well-known ſituation of Aſtracan; but by giving to the Black Sea a conſiderable extent from eaſt to weſt, he brings forward the

* A diſeaſe of the eyes.

Caſpian,

Caſpian, and withdraws a remarkable portion of Aſia towards the eaſt. Citizen Beauchamp having already determined the longitude of Iſpahan, thus diſcovered the error of Bonne, but it became ſtill neceſſary to give an exact admeaſurement of the length of the Black Sea, by aſcertaining the ſituation of Trebiſond, in reſpect to the meridian of Pera; this has alſo been accompliſhed by Citizen Beauchamp, on the recommendation of the board of longitude, and the queſtion is now fully decided. The difference of longitude between Paris and Trebiſond, is not 43°, as Bonne maintains, but 37° 18′ 5″; which ſubtracts more than 80 leagues from the length of the Black Sea. This determination was obtained by the application of the marine time-keeper, the diſtances of the ſun and moon, and the eclipſes of the ſatellites of Jupiter. The author of the memoir has annexed an account of the difficulties experienced by him, in repairing by ſea to Trebiſond, which is no longer remarkable at preſent, than in conſequence of our recollecting that it was once the abode of the Greek emperors.

Citizen Deliſle read a memoir on the palm-tree that produces the fruit called *dôum*, (or *doùm*.) After the enumeration of the characters common

common to the different *genera* of palm-trees, the author gave a minute deſcription of the berry of the *dômm*, and made it appear evident that this is preciſely the ſame as what Theophraſtus has denominated *cuſiofera*. It is not a little remarkable, that Bauhin, Pococke the traveller, and Linnæus himſelf, who have mentioned the palm-tree of the Thebaid, have not recollected that the *dômm* is the *cuſi* of Theophraſtus, although a figure of it be found in Dioſcorides. It is the more important not to neglect theſe approximations, as it may be eaſily ſuppoſed that certain plants have experienced conſiderable changes, during an interval of ſeveral centuries; and we have here an opportunity to remark with what care the ancients deſcribed plants truly worthy of notice, or in other words, ſuch as were uſeful.

Citizen Dolomieu inſiſted, in a memoir, on the neceſſity of combining with the ſtudy of ancient geography, a ſeries of geological obſervations on the conſtitution of the ſoil, and the changes which may have been produced by time: he applied theſe remarks to the ſite of the ancient Alexandria, and he fixes it in the interval that ſeparates two portions of a ſucceſſion of little hills, the *neucleus* of which, is compoſed

of a ſandy calcareous ſtone. Citizen Dolomieu attributes the alterations obſerved by him, to the encroachment of the ſea, and the decay produced by it; to a progreſſive increaſe of ſoil, carried thither by the waves, added to the immenſe quantities of rubbiſh, which have accumulated there; ſo that it is now difficult to diſtinguiſh the ruins which appertain to the different epochs. He further obſerves, that the ſea appears to have altered its level, and to have obtained an elevation of nearly two feet, ſince the time of the Ptolomeys: he propoſes to make an attempt to develope this ſubject in a future memoir.

Citizen Norry, in the name of a committee, read a report on the eſtabliſhment of a ſchool of deſign: this report was approved of by the Inſtitute, and is to be preſented to the commander in chief.

Citizen Parſeval continued the recital of a poetical tranſlation of a fragment of the ſeventeenth *canto* of Taſſo.

On the 10th *Vendemaire* (October 7th) the general of diviſion Berthier, chief of the general ſtaff of the army of Egypt, tranſmitted to the Inſtitute a plan of Egypt, according to its new diviſions.

A letter

A letter was read from citizen Dubois, profeſſor of the ſchool of medicine at Paris, in which he obſerved that a violent malady rendered him incapable of remaining any longer in Egypt, and thus deprived him of the ſatisfaction of participating in the labours of the Inſtitute. The ſecretary was inſtructed to notify to citizen Dubois, in the name of all the members of the Inſtitute, the regret occaſioned by this ſeparation.

Citizen Nouet read a memorial, containing the reſult of the obſervations made by him at Alexandria, with the view of determining the geographical poſition of that city, and alſo the direction of the magnetic needle.

Citizen Dolomieu ſtated to the Inſtitute, the precautions and diſcernment, which appeared to him neceſſary, in reſpect to the choice, the preſervation, and the removal of ancient monuments. A committee, was in conſequence of this, appointed to collect all the objects of antiquity which could be procured, diſtinguiſhing ſuch as local intereſt might render worthy of ſelection, from thoſe that could not be removed without inconvenience. The committee was compoſed of the citizens Caffarelli, Deſgenettes, Dolomieu, Dutertre, Norry and Sucy.

A memoir communicated by citizen Nectoux was read, in which he expoſed the peculiar facility with which an eſtabliſhment conſecrated to agriculture, might be formed in Egypt. A committee was appointed to examine into this ſubject; it was at the ſame time inſtructed, to make the neceſſary diſpoſitions for the melioration of the different ſpecies of produce, and to endeavour in particular, that this country ſhould enjoy the advantages reſulting from the multiplication of the cochineal. Citizens Berthollet, Coſtaz, Delille, Deſgenettes, Gloutier, and Tallien, were the commiſſioners nominated on this occaſion.

On the 21ſt *Vendemaire*, citizen Nouet, in the name of a committee, preſented an almanack exhibiting the diviſions of time, in conformity to the uſage of the French, the Cophts, and the Turks.

Citizen Deſgenettes, in the name of citizen Frank, phyſician in ordinary to the army, preſented the two firſt volumes of a work written in Italian, and entitled: "*Biblioteca medica Browniana, publicata da Luigi Frank, Firenze*, 1797." Citizen Deſgenettes ſeized this occaſion, to preſent a ſuccinct expoſition of the fundamental principles of Brown. While analyſing his doctrine, of which he diſcovered evident traces

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in the early periods of dogmatical medicine, he proved himſelf equally averſe to the exceſſive enthuſiaſm of its ſectariſts, and the no leſs exaggerated declamations of its adverſaries. On the whole, citizen Deſgenettes took pleaſure in praiſing the philoſophical and extenſive views of Brown, relative to the ſimplification of the *materia medica*, as well as the uſe of ſeveral energetical remedies, among which is opium.

The work in queſtion is to be depoſited in the library of the Inſtitute.

Citizen Le Pere preſented a copy of the plan of Alexandria, on a reduced ſcale: this plan which is in the ratio of a thouſandth part of the various dimenſions therein ſpecified, was effected after uncommon labour, by the engineers of the department of roads and bridges, united to the officers of general engineers, and thoſe dedicated to geography. The aſtronomers of the Inſtitute, alſo concurred in this work, having connected the principal points by means of a ſeries of triangles, and determined the latitude and longitude of the *minaret* of the caſtle where the light-houſe is ſituated.

An exact account of the ſoundings of the road and two ports, is continued at Alexandria; the progreſs of the alluvions and the ſtate and force

of the winds, are alſo attended to. By a compariſon of the reſults, a certain character of utility and preciſion will be given to all our plans for a maritime eſtabliſhment.

Proper perſons are alſo buſied about the deſcription of the ſubterraneous canals, which receive the waters of the Khalydje; an hydraulic plan of the city of the Arabs, will be thus obtained; the number of ciſterns that have been preſerved, may be eſtimated at 300, and a few years ſince, they furniſhed a ſufficient ſupply of water for eighteen months.

Citizen Beauchamp invoked the attention of the Inſtitute to ſeveral objects, tending either to augment the advantages reſulting from the poſſeſſion of Egypt, to contribute to the progreſs of the ſciences, or to become uſeful by application to the purpoſes of life. He at the ſame time annexed a ſeries of queſtions, and propoſed to appoint different committees either to examine into, or ſolve them. The Inſtitute, after diſcuſſing the ſubject, nominated the following:

1°. A committee, charged with collecting the moſt exact information as to the means of cultivating the vine in this country. It is alſo to point out ſuch ſpots as are beſt adapted for that purpoſe. The citizens Delille, Dolomieu, Geoffroy,

froy, Gloutier, and Savigny, were the commiſſaries ſelected on the occaſion.

2°. The aqueduct that conveys the waters of the Nile as far as the citadel, has experienced a conſiderable deterioration; the advantage uſually derived from it has ſuffered an interruption, and hitherto, the labours of more than one hundred and fifty oxen, furniſh but an inconſiderable ſupply: it has been therefore propoſed to offer a prize to the perſon, who ſhall preſent the beſt and moſt economical plan, for furniſhing the citadel with water. A committee, compoſed of the citizens Caffarelli, Coſtaz, Fourier, Le Pere, Norry, and Say, ſhall be employed to draw up the *programma*.

3°. A committee of the citizens Delille, Geoffroy, Gloutier, Le Pere, Malus, and Norry, is to examine if the immenſe maſs of ruins that ſeems to form a circle around Cairo, can be converted to any uſeful purpoſe.

4°. Citizen Bonaparte having recapitulated the advantages reſulting from an obſervatory, and pointed out the means of accelerating ſuch an eſtabliſhment, it is propoſed that the citizens Norry and Caffarelli be added to the aſtronomers of the Inſtitute, in order to fix on a proper ſtation. The report to be delivered at the next meeting.

5°. As the *megyas* or nilometer, may give riſe to intereſting enquiries relative to the two-fold object of ancient geography and public uſage: it is therefore reſolved that a committee be inſtructed to preſent an exact deſcription of this monument; to detail the hiſtorical facts which it has given riſe to, and to point out the changes it has experienced, diſtinguiſhing thoſe which ariſe from the elevation of the bed of the river; it is to examine at the ſame time, whether machines that are capable of being moved by the current of the ſtream can be ſtationed there to advantage. The citizens Coſtaz, Dolomieu, Dutertre, Le Pere, Norry, and Tallien, are to compoſe the committee.

6°. It is propoſed, as ſoon as poſſible, to commence an uninterrupted ſeries of thermometrical and hygrometrical obſervations, and alſo, to make experiments on the ſlow movements and oſcillations of the magnetic needle. The citizens Coſtaz, Beauchamp, and Nouet, are to inveſtigate this ſubject.

7°. Two committees, the one conſiſting of the citizens Deſgenettes, Dolomieu, and Say; the other, of the citizens Deſcotils, Malus, and Savigny, are appointed to ſuperintend the digging of wells, in various parts of the neighbouring deſert,

deſert, and alſo to examine the nature of the water, and all the ſubordinate circumſtances.

8°. In the neighbourhood of the aqueduct there is a conſiderable number of columns, which ſeem to have been formerly deſtined to decorate ſome public edifice: the citizens Denon, Norry, and Rigel, are to examine theſe columns in concert, and make a report on this ſubject.

On the 26th, citizen Norry delivered in a report in the name of the committee, charged to examine whether it were poſſible to derive any advantage from the ruins heaped up in a confuſed manner, around the city. He propoſed to remove and employ a part in the public works; the ſummits of theſe piles will thus be flattened, and leſs difficulty will be experienced in reſpect to cultivation. It is likely that wells may be dug, the waters of which can be elevated to the neceſſary heighth, by means of machines of a ſimple conſtruction: this ſpecies of hills will then enjoy the very rare advantage, in a country like this, reſulting from the varieties of expoſition.

Citizen Dolomieu obſerved on this ſubject, that the number of theſe heaps augments in a conſiderable degree, daily, and he remarked that it would be deſirable that the committee ſhould point out the means of preventing ſuch an accumulation,

mulation. Theſe obſervations were referred to ſeveral members, who are invited to make a new report on this ſubject.

A committe having been ſelected to examine the indigo preſented to the Inſtitute by citizen Porte, citizen Deſcotils read a report on the ſubject. He deſcribed the proceſs employed at St. Domingo for the manufacture of this valuable commodity, and compared it with that at preſent in uſe throughout Egypt. In both methods they agitate the liquor which contains the blue colouring matter with paddles: this ſubſtance, combining with oxygen, becomes inſoluble, and the indigo precipitates. But the principal difference conſiſts in this, that here they bruiſe the plant after having macerated it for an hour in water, at the temperature of about ſeventy degrees, while in St. Domingo, the proceſs of fermentation is allowed to commence. It reſults from the firſt mode that the ſoft parts of the plant mingle with the indigo, in conſequence of which the colour is altered; and it appears on the other hand, that the fermentation deſtroys the extract of the plant, which remaining in combination with the colouring matter, oppoſes the complete oxygenation.

The committee was convinced that the Egyptian

tian proceſs, which no traveller hath hitherto deſcribed, is capable of producing an indigo far ſuperior to that at preſent manufactured, although of an inferior quality to what has been obtained by citizen Porte. The latter appears to unite all the properties of the fine indigos employed in the commerce of Europe; and the manufactures in which this method may be adopted, will be entitled to the ſupport of government. Theſe concluſions were adopted by the Inſtitute.

Citizen Nouet gave an account of the examination made by a committee of which he is a member, relative to the different ſituations pointed out for an obſervatory. This committee is of opinion, that an inſulated building ſhould be erected, deſtined entirely for aſtronomical and meteorological purpoſes.

A committee having been appointed to examine ſeveral columns depoſited near the firſt reſervoir of water, belonging to the grand aqueduct, citizen Denon made a report on this ſubject.

Citizen Nouet delivered a report, in which he enumerated the various meteorological obſervations now practiſed; he at the ſame time deſcribed the inſtruments generally employed for this

this purpoſe, and pointed out the neceſſary precautions for regulating their uſe.

Citizen Dolomieu read a memoir on the cauſes which have produced the deſtruction of the monuments of the ancient Alexandria; and he particularly remarked the effects in the building called the *moſque of the thous and pillars*. Within the walls of this place, where, according to ſome, the celebrated Greek tranſlation of the bible was completed: a multitude of columns of Grecian architecture, of very unequal proportions, are now to be ſeen. The marble and granite have not been able to reſiſt that continued impreſſion which leads inſenſibly to decay. The ſcattered and deformed remnants of the fortifications of Alexandria bear teſtimony, in a ſtill more convincing manner, of the ravages of time. Theſe are modern, and ſcarcely reach beyond the expedition of Selim I. that is to ſay, the end of the fifteenth century.

After this expoſition, citizen Dolomieu enquired into the nature of that cauſe to which theſe monuments are a prey; which attacks the hardeſt ſtones in their natural beds; penetrates into the interior of edifices; and amidſt encircling ruins permits nothing to ſubſiſt, but the broken

broken remnants of a few vaſes of baked earth. He conſiders the formation of the muriatic ſalts as a particular and acceſſory cauſe, which acts on calcareous maſſes alone; for the rubbiſh of decompoſed granite is not impregnated with any ſalt. He imagines that all the facts detailed by him, as well as the circumſtances which accompany them, may be explained in a natural manner, by the frequent variations of the hydrometrical ſtate of the atmoſphere. This alternation of dryneſs, and humidity, which is daily repeated, removes the *moleculæ* by little and little, and at length, ſeparates them entirely. The humidity of the nights, being perpetuated by the great abundance of dews, is moſt ſenſible in the inferior region of the atmoſphere; it is entirely diſſipated by a nearly inſtantaneous evaporation, and the deſiccation is ſtill more rapid, wherever there is an eaſtern or ſouthern expoſition. It is accordingly towards the ſouth-eaſt, and in thoſe parts of buildings that are neareſt to the ground, where the principal waſte is remarked, which does not extend above fifteen feet in height. Stones bedded in water, or ſuch as are covered with a layer of earth; thoſe alſo, which ſerve to ſhut up any encloſure where the air does not circulate freely, do not experience at all, or at moſt, but in a very

very ſmall degree, the daily ſucceſſion juſt alluded to, and thus eſcape as it were, from this cauſe of deſtruction which annihilates the precious remains of ancient monuments, and the barbarous traces of the middle ages. During the ſeſſion of the 6th, Brumaire, (October 27th) citizen Geoffroy read a critical diſſertation on that ſpecies of monkey called *cynocephalus* by the ancients, which is the ſame as that now carried about the ſtreets of Cairo.

Buffon imagined he had diſcovered this ſpecies in the magot; and it has ſince been confounded with the papion or ſimia-ſphynx. As the only perſons among the moderns, who obſerved the true cynocephalus, have not left a written deſcription, but only an imperfect print, it became difficult to diſtinguiſh between two ſpecies which reſemble one another in ſo many points: there exiſts, however, a remarkable difference in many particulars, which citizen Geoffroy has pointed out. He took occaſion to animadvert on the ſuperſtition of which this animal was the object, in ancient Egypt, the worſhip rendered to it, and the uſe that appears to have been made of its perſon in the hieroglyphics, on purpoſe to indicate the phaſes of the moon, and the diviſion of time.

Citizen

Citizen Le Pere delivered a report on the 11th Brumaire, in the name of the committee, commiſſioned to propoſe a geographical ſcale proper to be adopted for the plans of cities and provinces. This report was adopted.

The examination of the ſcheme of a windmill, preſented by citizen Cecile, was referred to a committee compoſed of citizens Monge, Le Pere, and Malus.

Citizen Geoffroy read a report in the name of a committee concerning the functions of the librarian. The different articles were adopted. The Inſtitute then proceeded, by way of ſcrutiny, to the nomination of one, when the ſuffrages were in favour of citizen Ripault.

Citizen Geoffroy preſented a memoir, in which he examined the nature of the horn of the ſtag, as well as the cauſes of the periodical fall, and reproduction of that organ.

On the 16th, citizen Geoffroy preſented a collection of memoirs on natural hiſtory to the Inſtitute; this was depoſited in the library. He alſo in the name of a committee, propoſed a ſeries of articles concerning the election to vacant places in the Inſtitute: theſe were adopted.

During the ſeſſion of the 21ſt Brumaire, citizen Le Pere delivered a report, in the name of the

the committee that had been appointed on the 10th, to examine the plan for a windmill by citizen Cecile. This committee, to which the citizens Fourier and Cortay had been added, was invited to preſent a new report, in which the project of citizen Cecile is to be compared with that confided to the direction of citizen Conte.

A committee having been appointed to enquire if the ruins heaped up about the city could be converted to any uſeful public purpoſe, the citizen Le Pere treated this ſubject in a report under a variety of different points of view. It was then requeſted that the committee ſhould point out ſuch machines as they might deem proper for conducting water to theſe eminences, with a view of fertilizing and rendering them valuable; it is alſo to eſtimate, with as much preciſion as poſſible, their preſumed produce, the expences requiſite for the execution, and particularly the extent of ground which may be refreſhed by one of theſe machines.

Citizen Bonaparte propoſed to nominate a committe to examine the proceſs followed by the inhabitants of the country in the cultivation of corn, and to compare it with that cuſtomary in Europe: this propoſition was adopted, and

and the citizens Dolomieu, Gloutier, and Delille were appointed for this purpose.

Several members having had repeated opportunities of obſerving the addreſs and confidence with which certain inhabitants of this country handle, play with, and even ſeem to attract ſerpents towards them, a committee, compoſed of the citizens Deſgenettes, Geoffroy, and Denon, was appointed to examine into the facts, and deliver a report thereon, adding at the ſame time ſuch remarks as their obſervations may have given riſe to.

On the 26th citizen Fourier preſented a report on the aqueduct that conducts the waters of the Nile to the caſtle of Cairo; he aſſigned the epoch of its conſtruction, and gave a deſcription not only of itſelf, but alſo of the machines employed there: he at the ſame time ſubmitted to diſcuſſion a ſketch of the *programma*, to be publiſhed by the Inſtitute on this ſubject.

The Inſtitute reſolved, that after its ſecretary ſhould have conſulted the commander in chief relative to ſome of the details, a definitive project ſhould be preſented.

Citizen Le Pere delivered a report relative to the plan of a wind mill, now conſtructing under

the direction of citizen Conte. During a viſit on the part of the committee, it had aſcertained that his ſcheme united all the advantages which circumſtances would allow of; this viſit alſo afforded it an opportunity of doing juſtice to the order and preciſion which reigned throughout his yards and work-ſhops.

Citizen Larry, ſurgeon in chief to the army, once more ſubmitted his memoir on the ophthalmy: this work was referred to a committee, compoſed of citizens Berthollet, Deſgenettes, and Geoffroy, which was at the ſame time charged to make a ſpeedy report.

Citizen Andreoſſy read a paper containing the multifarious obſervations collected by him in the eaſtern and northern parts of the ancient Delta, while employed in obtaining information relative to the lake Menzaléh. He deſcribed the preſent ſtate of that lake, the iſles inhabited of old, the town of Menzaléh, the country adjacent to the lake, the mode of cultivation at preſent followed; in fine, he gave an account of the ruins of Tennys, of Torinah, of San, and of Peluſe. He had recognized the Phatnitical, Mendeſian, and Tanitical branches, and he now diſcuſſed the cauſes to which the original formation

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of lake Menzaléh ought to be attributed, as well as the operations proper for draining it.

The citizens Berthollet and Deſcotils preſented obſervations on the properties of *Hhenné*, conſidered as a dye. This ſhrub, known to the ancients by the name of the cyprus, is cultivated both in India and Egypt. Its leaf, when dried rapidly in an oven, and afterwards bruiſed, abounds with a colouring matter. By employing it alone with wool, a durable reddiſh colour is obtained: it alſo gives, through the agency of allum water, and ſulphat of iron, a variety of different ſhades of brown, which promiſe great advantages, both on account of the durability of the tints and the eaſy rate at which they may be obtained.

The ſeſſion of the firſt Frimaire (November 21ſt.) was opened by a mathematical memoir, addreſſed to the Inſtitute by citizen Corancez. The author examined the means of remedying the alteration produced in the movement of watches, by the change of temperature: he propoſed to compoſe the balance wheel of different metals, and endeavoured to obtain by calculation the proper ſhape of the ſeveral parts, that ſo the *vis inertiæ* may remain the ſame, while the oſcillating maſs is either dilated or condenſed. The examination of this ſubject was referred to a com-

mittee, compoſed of the citizens Coſtaz and Fourier.

Citizen Savigny read a diſſertation on the natural hiſtory of the country: he enumerated the various ſpecies of animals hitherto obſerved by him in the Lower Egypt, more particularly the different kinds of inſects. He at the ſame time pointed out ſome of the cauſes which may have contributed to reduce the variety of the ſpecies in this country.

Citizen Norry, in a letter tranſmitted from Alexandria, ſtated the motives which, by preventing him from making a longer ſtay in Egypt, thus deprivēd him of the ſatisfaction of participating in the labours of the Inſtitute. In conſequence of the obſervations of a member, it was reſolved, that the ſection of the Fine Arts ſhould prepare a liſt of candidates by the 11th Frimaire, for the purpoſe of ſupplying his place.

Citizen Sucy read ſome remarks on the cauſes of the regular increaſe of the Nile, and inſiſted on the utility of conſulting ſuch of the inhabitants of the neighbouring countries as were then in Cairo, relative to the ſource of that river. He alſo moved that the committee appointed to take this ſubject into its conſideration might at the ſame time collect every poſ-

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ſible article of information relative to the upper waters of the Nile, and the hiſtory, both natural and civil, of Abyſſinia and Nubia. This propoſition was adopted, and the citizens Beauchamp, Coſtaz, Dolomieu, Geoffroy, and Sucy, were ſelected to compoſe the committee.

EXTRACT OF A REPORT

Delivered to the Inſtitute, relative to the Manufacture of the Saltpetre and Gunpowder of the Country.

By Citizen ANDREOSSY.

At Cairo, the 11th Fructidor, 6th Year of the French Republic.

SULPHUR, charcoal and ſaltpetre, are, as every body knows, the materials made uſe of for the compoſition of gunpowder. Egypt does not produce any ſulphur; it is uſually carried hither from Venice and Trieſte; it might be brought directly from Sicily, in which caſe it would be cheaper

The production of which they make charcoal is ſelf-ſown in the country; this is the lupin, a plant that bears a ſmall bitter fruit, which might be employed in the manufacture of beer. The ſtalk of the lupin is converted into a very ſoft charcoal, which leaves a diſtinct mark when applied to paper. This charcoal is burnt in trenches, and the ſpace of three hours is ſufficient for that purpoſe. After pounding it, it is paſſed ſix or ſeven times through a ſieve, on purpoſe to obtain

obtain the finer particles alone. This cumbuſtible may be employed in large quantities, without augmenting the conſumption of wood proper for fuel.

Saltpetre appears to be an indigenous production of Egypt; the infrequency of rain, a continual heat, the moiſt air of the night, a ſoft and light ſoil; all theſe concur in its formation. It is ſaid that the earth containing ſaltpetre is found in veins, which are worked in ſome places in the neighbourhood of Cairo; theſe veins are very productive during three or four months, and at the end of that period, they are abandoned for an equal ſpace of time, during which the ground being expoſed to the influence of the climate, becomes once more prolific.

The proceſs employed here in the manufacture of ſaltpetre, is exactly the ſame with that practiſed in Europe. One circumſtance, however, renders this mode not only very ſimple but alſo unexpenſive. The ſaltpetre is found in this country already formed in the earth, while in France they are uſually obliged to obtain nitre with an earthy baſis by means of a ley, which is afterwards converted into ſaltpetre by the admixture of potaſh, an expenſive and foreign production.

Saltpetre is manufactured on the road from New to Old Cairo, behind thoſe little eminences of rubbiſh, produced by the avarice and careleſsneſs of the Mamelukes: this eſtabliſhment does not preſent any thing remarkable. Boxes made of boards ſerve as vats, and they are placed in the open air.

A trench formed on the ſurface of the earth, conducts the water impregnated with ſaltpetre into a reſervoir under a hut, while a large copper caldron with a furnace beneath, is fixed by its ſide.

The combuſtibles employed on this occaſion are the ſtalks of Indian corn, as well as a plant that appears to be a ſpecies of graſs, which grows in arid lands; this plant does not produce ſo much heat as the ſtalks of Indian corn.

The ſaltpetre obtained by the firſt boiling, is pretty good. It is purified by a ſecond and third operation, during which a mucilage of whites of eggs is employed.

The gunpowder is fabricated by means of manual labour; it is compoſed of eight parts of ſaltpetre, two of ſulphur and two of charcoal. Theſe three materials are thrown into mortars cut in ſtone, and rounded at the bottom; the diameter at top is one foot, and the depth is alſo

alſo one foot. In a parallel direction, and at a little diſtance from theſe, is a ſtone bench, on which the workmen ſit. They are naked from head to foot, except a few rags, which are twiſted round the middle. Every mortar contains fifteen pound of compoſition: this is pounded for ſeven hours, by means of a peſtle formed of an extremely hard wood that is brought from Syria. The workmen accompany the deſcent of the peſtles with a ſtrong aſpiration, which enables them to act in concert, and ſerves to produce uniformity in the operation. They labour with theſe peſtles, which weigh 9,294 *grammes*, during four hours, they then reſt for two, reſume their work for three more, and gain by this employment about from twenty to twenty-five *parah* a day.

A very ſmall quantity of water is thrown into the mortars, to render the compoſition humid, and facilitate the mixture and compreſſion of the materials. When taken out of theſe, it is paſſed through hair ſieves, like thoſe employed for corn, the interſtices of which have more or leſs width, in proportion to the finer or coarſer powder that may be wanted. The commodity is then grained, by preſſing it againſt a grating with

with the hand, taking care to communicate a circular motion to it at the ſame time.

The gunpowder manufactured at Cairo appears to be good; the materials of which it is compoſed are excellent in point of quality; and according to recent enquiries, it appears that ſeven hours is a longer portion of time than is required for grinding it; by regulating it according to the ſtandard of France, which is acknowledged to be the beſt, the ſtrength may be augmented, and the conſumption of ſulphur, the ſole material that is imported, greatly diminiſhed. Gunpowder is not ſo dear at preſent in Cairo as it was in France, anterior to the revolution.

Egypt exports yearly to Leghorn, and Marſeilles, fifteen hundred *qanthars* * of ſaltpetre, of the third boiling, which is ſold at Cairo, at from nine to nine dollars and a half each. About two thouſand *qanthar* of gunpowder, are manufactured every year at Cairo; from fifty to ſixty *qanthar* were formerly conſumed in eſcorting the caravans; the remainder was either exported to Syria, and Cyprus, or ſold to the Arabs.

* The *qanthar (gonthar*, or ganthar) is the quintal of the country; it weighs about 91 pounds avoirdupois, and is divided into a hundred *rothl*. The *rothl* amounts to 14 ounces, 4 qr. 27 grains. (J. J. M.)

The

The Mamelukes do not poſſeſs any large magazines. Each Bey collects in his dwelling ſome qanthars of gunpowder, two or three pieces of canon, and a few cheſts of arms, in proportion as he poſſeſſes Mamelukes, and horſes proper for mounting them: the union of all theſe conſtitutes the whole military force of Egypt. Mourad-Bey was the only one who was accuſtomed to keep any quantity of gunpowder. After the death of Iſmail-Bey, he found about a thouſand *qanthar* of ammunition among the ſpoils, and within the ſpace of the laſt ſeven years, he has purchaſed from five to ſix hundred more.

The fabrication of gunpowder was confided to the induſtry of a few foreigners, who had ſettled in Egypt. It has already been ſeen, that the conſumption of the government, added to the exportation, amounted to a mere trifle; thus the product was of courſe inconſiderable; nothing is more eaſy however than to encreaſe it. Egypt poſſeſſes two eſſential materials, the charcoal and the ſaltpetre, the latter of which is in ſome meaſure already prepared; ſulphur can be brought at proper opportunities from Sicily by the way of Malta; the eſtabliſhment may thus be eaſily augmented, and the workmanſhip ſimplified. Egypt can furniſh gunpowder to our French

French iſlands in the Mediterranean, to the arſenals of our Italian and Spaniſh armies, and might even export to Marſeilles, and the ports of Languedoc, and Rouſſillon, a large quantity of ſaltpetre, which would circulate throughout the ſouthern departments of France, and alſo in the interior.

Higher Egypt poſſeſſes ſome manufactories of ſaltpetre and gunpowder, the particulars of which, we have not as yet been able to learn.

N. B. We have entered into a few of the details relative to the fabrication of gunpowder, the object of which was entirely foreign to the *programma*, merely for the purpoſe of painting the barbarous phyſiognomy of the arts, among a people who have attained the laſt ſtage of degeneracy.

DESCRIPTION OF THE ROUTE FROM CAIRO TO SSALEHHYEH.

Cairo, 16th Fructidor, 6th year.

Egypt has always fixed the attention of the literary world, more than any other portion of Africa. A multitude of travellers have accordingly repaired thither to ſeek for the veſtiges of its ancient ſplendor, but a wretched, and barbarous people, have conſtantly oppoſed their reſearches. It was impoſſible

poſſible for the antiquary to rummage the boſom of the earth; the naturaliſts were afraid to wander along the fields; the geographer did not dare to make uſe of his inſtruments: thus the prying eye of the European could merely ſkim along the banks of the Nile, and beyond its ſhores we knew little or nothing.

But the conqueſt of Egypt preſents a new field for letters. All our notions relative to that intereſting country will be ſucceſſively aggrandized; that ſpirit of inveſtigation with which we are at preſent electrified will be ſatisfied, and we ſhall be at length able to point out the road that leads to the perfection of divers branches of the ſciences. But that which will be firſt enriched by our labours is geography. To conquer, is in other words, to march over, and become acquainted with a country. The French had ſcarcely carried the terror of their arms into new climates, when they haſtened to render even the preparations for victory uſeful, that they might thus do homage to the arts. The rapid ſketch of the various poſitions of a country, and their connexion with military movements, will henceforth ſerve to direct the progreſs of the merchant, and, perhaps, to extend the induſtry of the farmer.

They

The route followed by the three diviſions of the army in purſuit of Ibrahim-Bey, was unknown until our time. Since the period of the croiſades, no European had traverſed thoſe provinces. Neither Pococke in his numerous journies; nor Niebuhr, who diſplayed ſo much conſtancy in his reſearches; nor Norden, who deſcribed Egypt with uncommon minuteneſs, dared to penetrate them. The deſcription of this extent of territory, being then abſolutely new, it has of courſe ſome pretenſions to the curioſity of the public.

One leaves Cairo by the gate of Naſſr (*Bab-en-naſſr* *, the gate of victory). The deſert is the firſt

* The gate d'En-naſſr (or of victory) is one of the entrances of Cairo, and looks towards the eaſt. "It was originally ſituated at ſome diſtance from the place where it now ſtands, according to the Maqryzy; but when the Emyr El-Djyouch Bedred-dyn El-Djemaly quitted the city of Acre, to become vizir of Egypt, under the Khalyfat of Al-Moſtanſſer Billah, in the year 465 of the hegira (1072 of the vulgar æra), he built the walls of Cairo, and changed the ſpot which the general Djaucher had aſſigned to this gate, in order to transfer it to its preſent poſition, and it is now nearer to the *Moſslay El-Fyd*. He added to it a kind of covered way, *(Bachourah)* part of which ſtill remained when the ſiſter of El-Dtaher Barqouq cauſed a ciſtern to be

firſt object which attracts the eye; its parched limits encircle the walls of the city, after having invaded part of the ſuburbs. Groupes of deſerted houſes are to be ſeen in the midſt of this whitened plain. The moſt conſiderable of theſe places is called *Qoubbeh, (El-Qoubbet El-a-adelyeh*, the dome or cupola of juſtice *), It is a moſque ſurrounded by regular edifices, built with ſtone, and having galleries before them. At a league from Qoubbeh you fall in with the village

be dug there, which is at preſent deſtroyed, and a road ſubſtituted in its place."

Above the gate of *En-naſſr* is to be ſeen the following inſcription in koufic characters: *La illah illah allah, oue Mohhammed reçaul ullah, A'ly ouely ullah, ſſelouat ullah a'lay houma* (there is no god but God; Mohhammed is the apoſtle of God, and A'ly the friend of God; may the divine grace protect them!)" See La Deſcription Geog. Polit. &c. de l'Egypte, par le Maqryzy, article des portes du Caire, pages 212 et 213 du numero 682. M.S. Arab. de la Bibl. Nat. (L——s.)

* El Qoubbet Ela'-a'adelyeh, does not ſignify the *dome* or *cupola of juſtice*, but merely the cupola (the moſque) A'delyenne, that is to ſay, founded by El-melek El-a'adel Aboubekr Ebn Eyoub, brother of the famous Saladin (Sſalahhed-dyn), and known in the hiſtory of the Croiſades by the name of Saphadin. This prince, who was at firſt ſultan

lage of *El-Matharyeh* *. The obelisk perceived there, points out the ruins of the ancient Heliopolis. A search has just been commenced, which may lead to the discovery of more interesting objects. The village of *El-Mardje*, which lies at the back of this, is perceived at a great distance on account of the grove by which it is surrounded. Several thousand palm trees, planted in the manner of a quincunx, shade the ruined huts.

This route, which is that followed by the caravans, in their journey to Syria, astonishes the European on account of the fantastical appearances it exhibits: it seems to form the boundary between Egypt and the desert. The sands are always on your right, the cultivated lands constantly on your left; the human eye

sultan of Krak, and Damascus, ascended the throne of Egypt, after having displaced Mansour, his grand nephew. He died August 1, 1218 of the vulgar æra, at the age of seventy-three years; he had reigned eighteen. See the Universal History of Gregory Aboulfaradje, in Arabic and Syriac. (L——s.)

* El-Matharyeh signifies rain, or fresh water. This place is in fact the only one, within a considerable distance, where a spring is to be found. It was formerly famous on account of the balm produced there; it is the *a'inchems*, or fountain of the sun of the acients The French commonly write it *la Mutharee*. (L——s)

is

is bewildered in the extent of the firſt; it gladly repoſes on the other. The more you advance, the more Egypt is covered with woods: the villages are ſcarcely diſtinguiſhable amidſt the enormous maſſes of date trees. Large ſycamores are not uncommon, and almoſt every where we meet with vaſt incloſures of acacia and citron trees. But it is neceſſary to prevent all illuſion while depicting theſe groves; neither verdure, nor flowers, nor rivulets embelliſh their neighbourhood. Trees, which are accompanied by ſo many charms in Europe, here inſert their roots in an argilaceous ſoil, yawning with fiſſures, and every where evincing the aſpect of the moſt hideous poverty.

If the eye ſhould wiſh to fix itſelf on one ſide, on a more active vegetation, a little reflection deſtroys the momentary impreſſion, for the outline of the deſert is at the ſame time beheld making an incurſion on the cultivated land. The hillocks deſtitute of cupolas exhibit only abandoned habitations, and at every ſtep we meet with the traces of agriculture, nearly effaced by the ſand, while we ſearch in vain for a ſmall portion of the arid border that has been reſtored to huſbandry.

From the village of El-mardje may be diſtin-

guiſhed the ſpot called *El-khanqah,* which is conſidered as one of the moſt important places in the country. Between theſe two villages is a tufted grove; it occupies the ſummit of an aſcent, that inclines gently towards the deſert, and terminates at the famous lake *Berket-el-hhadje* (the lake of pilgrims). At preſent it is nothing more than a parched maſs, ſurrounded by ſeveral rows of trees.

The hamlet which I have juſt deſcribed, appears to correſpond with that which formerly contained the Peluſiac branch; this was the moſt caſterly channel of the Nile; it advanced towards the deſert, and has probably diſappeared in conſequence of the overwhelming whirlwinds. The water formerly conveyed by it is no longer viſible, while at a ſhort diſtance in its rear, canals ſtill exiſt in the place of thoſe which flowed towards the mouth of the Mendezian channel.

The frequent paſſage of caravans was aſſuredly the cauſe of the increaſe of *El-Khanqah.* What ſtill exiſts of this village, three parts of which are converted into ruins, indicates a remnant of its former opulence, and alſo of the care with which it had been conſtructed: it is the firſt place in Egypt where I have ſeen a ſtreet laid out in a ſtraight line.

After

After paſſing El-Khanqah we meet with a ſucceſſion of villages, which preſent nothing remarkable; and at the end of ſeven hours arrive at *Belbeys*, the only town to be met with in this route. Belbeys, which is believed to be the ancient Bubaſtum, only contains ruined houſes, and miſerable inhabitants; it ſcarcely occupies one third of its former dimenſions, as may be eaſily perceived from the traces of the ramparts, which yet exiſt. Six centuries ſince, this place was the only bulwark of Egypt againſt Syria. In 1164 it oppoſed a vigorous reſiſtance to the attacks of Amurath, king of Jeruſalem, and contained wealth ſufficient to occupy his army during three whole days with its pillage.

This event, which appears to have been common enough, was perhaps the principal cauſe of the ruin of the Latins in Paleſtine. Until then, the valour of our knights was ſupported by the auſterity of their manners, and a ſpotleſs probity: they were reſpected by their numerous enemies, who even appeared jealous to imitate them. But Amurath, by invading Egypt in oppoſition to the faith of treaties (in 1168), and withdrawing in conſequence of the receipt of certain ſums of money, deſtroyed the illuſion produced by the valour of the Franks. The Turks were not

aſhamed to add perfidy to the immenſe ſuperiority of their forces; and the feebleneſs of the Chriſtian adventurers increaſing by corruption, rendered them unable to retard their fall.

On leaving Belbeys the country appears more fertile than ordinary; the villages ſucceed without interruption, and connect themſelves together by means of orchards. The fountains and inſulated cupolas alſo become more frequent. But theſe ſcenes are diſpelled the moment we paſs *Sſoriah*: all the cultivated lands diſappear towards the left ſide; and it is neceſſary to traverſe three leagues of deſert, as far as Qorayn, unleſs a conſiderable circuit be preferred.

The place called *Qorayn (Qorain)* is a pretty large wood, which contains from eight to ten houſes, with their gardens. It enjoys conſiderable reputation in this country, on account of its caſtle; but certainly no European will be willing to attach the idea of a ſtrong hold, to a collection of houſes ſurrounded by an earthen wall, through which he enters by a gate, deſtitute even of faſtenings; but in this country, defences like theſe are ſufficient to convert any encloſure into an inexpugnable aſylum, the violation of which will never be attempted by men on horſeback, armed with nothing better than lances.

From

From Qorayn, ſix leagues ſtill remain before you arrive at *Sſalehhyeh*. During one half of the journey the road leads along the ſide of ſome villages, but they are ſoon left at a diſtance, as it is neceſſary to paſs through an uncultivated waſte, that continues until you arrive at the place of your deſtination.

Sſalehhyeh, although it does not poſſeſs that pleaſing appearance which the tufted gardens of Qorayn produce, is however far more extenſive: a wood, above two leagues in length, encloſes about ten villages, as well as a fine moſque built entirely of ſtone. The Arabs call all theſe inſulated woods, iſles, *(djezyret)*, an expreſſion that conveys an alluſion to the uncultivated lands that ſurround them, and which prevent as few reſources as the waters which encircle an inhabited land.

The name Sſalehhyeh is derived from that of *Melek-Sſalehh**, the famous ſultan whom our

* It is neceſſary to write and pronounce it *Sſelahh*, and not Sſalehh. The whole of the name is *Sſelahh ed-dynyou-conſebn eyoub ebn chady*. The word *el-melek* is a title that ſignifies king. I think it proper to remark here, that the *alif* does not appear to me to be neceſſary in the word Sſalehehyeh, which ought to be written Sſalehehyeh, without the *alif*. (L—s.)

authors term Saladin; it was he who firſt fixed the attention of Egypt on thoſe diſtant villages.

Experience had convinced this warlike prince of the inſufficiency of the ramparts of Belbeys; he alſo perceived the danger that menaced Damietta *(Damyath)*, if the Chriſtians happened to attack it, and he did not wiſh that the exiſtence of his empire ſhould be ſhaken by a ſingle ſiege. To poſſeſs a ſtrong place on the enemy's flank while aſcending the branch of Damaſcus, and to ſtop the progreſs of an army coming from Syria, was the object propoſed by Saladin, in conſtructing a fortreſs at Sſalehhyeh, which is abſolutely the laſt boundary of the cultivated lands of Egypt. At the end of theſe woods commences the iſthmus of Soues *(Souys)*, and it is then neceſſary to traverſe fifty leagues before any inhabited ſpot is to be met with. During the whole of this ſpace the traveller meets with nothing but a barren ſoil, and falls in with only ſeven wells, which afford but a ſcanty ſupply of brackiſh water.

It was in vain we endeavoured to diſcover the veſtiges of the fortreſs of *Melek-Sſalehh*: even the tradition of its ſite has been forgotten.

After having thus preſented a general idea of the places which it is neceſſary to traverſe during the

the ſpace of twenty-five leagues, it may be proper to take a rapid ſurvey of the ſoil and the inhabitants.

The preponderant *caſt* in theſe countries, without being the moſt numerous, is that of the Bedouyns. Their camps are ſtretched at ſome diſtance from the villages of Egypt, for they always give a preference to the ſoil where they reign—the ſands of the deſert. Theſe Arabs appear to me to be more opulent than thoſe which I have formerly ſeen along the banks of the Nile. It is true indeed, that a thouſand reſources are here preſented to their induſtry: ſometimes they traffic with the produce of their herds, at others, they either extort a ranſom from, or eſcort the caravans. Many of them cultivate the earth, and all of them poſſeſs a peculiar taſte for the branch which is the moſt lucrative of all their revenues: that of pillaging every thing without the pale of their tribe. Their cabins appear to be different from thoſe low tents, where the Arabs of Damanhour ſquat themſelves down; the walls of their habitations conſiſt of matts compoſed of ruſhes; and the tent, which is always ſpacious, only covers the middle of it.

Within prevails a kind of abundance, which is always however relative: milk, rice, barley,

are not uncommon; the utenſils are numerous, and not unfrequently bales of valuable goods taken from travellers are buried beneath.

This degree of plenty has an influence on their manners. Although well provided with every thing except fire-arms, which are difficult to be procured, yet they but ſeldom engage with their enemies. They treat with the Mamelukes, and ſpare the inhabitants, never recurring to violence, unleſs perfidy ſhould prove unſucceſsful, and attaching no ſhame to a precipitate flight from danger. Accordingly, on our arrival, one of our horſemen drove ſeveral of them before him—this cowardice ſurpriſed us greatly, as it formed an exact contraſt with the courage of the Bedouyns in the neighbourhood of the branch of Roſetta (Rachyd), whom we had ſeen approach under the very muzzles of our muſkets, in ſearch of an uncertain booty.

The Fellah inhabiting the Charqueh, appears to me to be leſs wretched than him who lives on the borders of the Nile: there are ſhades even in miſery. The culture of the ſoil of itſelf demonſtrates, that all the produce is not wholly abſorbed by the proprietor who reſides at Cairo. Until then, during the courſe of our journey, we had ſeen nothing but immenſe fields, full of large crevices,

crevices, which being equally deſtitute of furrows and encloſures, appear to have been tilled by an unintereſted hand, and to be watered once a year by the encreaſe of the Nile alone. Here it is otherwiſe; every foot of earth exhibits the toil of the peaſant; the wells are kept in order; trenches prepared with great exactneſs, conduct the canal along the fields, while an immenſe number of beds, ſurrounded by a ledge, preſerve the moiſture on the fields that have been already watered.

Other obſervations may be added to theſe reſpecting the cultivation of the lands, and I might quote the immenſe quantity of date trees, each of which has its net, thoſe ſpacious orchards, thoſe villages ſurrounded by a ſquare wall, if they be near the deſert; in fine, that lively ſolicitude painted on the countenances of the inhabitants at our approach, far different from the apathy which ever accompanies extreme indigence, and which we had remarked in other places, during the courſe of our journey.

But to what are we to attribute this melioration in the lot of the peaſant? Is it the conſumption occaſioned by the caravans? And is this the only commerce? I do not preſume that to be the caſe, and I am rather inclined to aſcribe the

the cauſe to the diſtance of their oppreſſors. The Mamelukes levy their exactions with ſecurity in ſuch places as are ſituated on the borders of navigable canals; for their waters bearing away with rapidity the fruits of their ſpoliations, all fatigue on the part of the emiſſaries of the government is thus ſpared. But here, in order to traverſe twenty leagues of ground, more expenſive preparations muſt be recurred to, and a larger body of ſatelites employed: a few men are not ſufficient to domineer over a crowd of villages, ſituated in a narrow ſpace, and thoſe Arabian camps replete with combatants. To form an eſtabliſhment with a numerous retinue, it would be neceſſary to leave Cairo; and to multiply the number of their forces, by means of conſtant activity, would not comport with the indolence of the Mamelukes. The Beys, who are proprietors of the Charqyeh, being forced to chooſe between a leſs abundant, but certain revenue, and the hope of a larger one, accompanied by danger and fatigue, prefer repoſe. Their principal wants originate in luxury and enjoyment; and thus the inhabitants of the borders of this deſert find a refuge againſt tyranny in the vices of their maſters.

P. S. I ſhall

P. S. I ſhall affix to the bottom of this deſcription an approximation of the reſpective diſtances, and alſo of the population of the places already mentioned; this will ſerve to fix the ideas which may be formed relative to theſe countries, until more exact obſervations ſhall have rectified mine.

El-Qoubbeh, a deſerted village, at half a league from Cairo.

El-Matharyeh, five hundred inhabitants; ſituated one league from El-Qoubbeh.

El-Mardje, eight hundred inhabitants; it is a league and a half from El-Matharyeh.

El-Khanqah, one thouſand inhabitants; it is a league and a half from El-Mardje.

El-Menyeh, two hamlets, at two leagues and a half from El-Khanqah, with about one thouſand inhabitants.

Belbeys, eight hundred heads of families.

This in the Eaſt, on account of the number of women, may be eſtimated at ſix perſons to each family; thus amounting to nearly five thouſand inhabitants. This town is five leagues from El-Menyeh.

Sſouat, eight hundred inhabitants; four miles from Belbeys.

Qorayn,

Qorayn, three leagues from Sfouat; conſiſting of from eight to ten hamlets, which contain about four thouſand inhabitants.

Sfalehhyeh, ſix leagues from Qorayn; fifteen hamlets, and about ſix thouſand inhabitants.

There are ſeveral other intermediate places, but we traverſed them with ſuch rapidity, that it was impoſſible to make any remarks.

CIRCULAR

CIRCULAR LETTER,

From Citizen DESGENETTES,

To the medical Men of the Army of the Eaſt, relative to a Plan for drawing up a Phyſico-Medical Topography of Egypt.

Head Quarters at Cairo, 25th Thermidor, 6th Year of the French Republic.

THE army, citizens-colleagues, after a ſiege, ſeveral battles, many ſkirmiſhes, and the moſt diſtreſſing marches acroſs the deſerts, begins, for the firſt time, to enjoy ſome moments of repoſe, ſince its arrival in Egypt. Its prodigious activity hath hitherto ſtifled the germ of thoſe diſeaſes, which are now likely to make their appearance, and concerning the treatment of which, it is proper for us to make the neceſſary proviſion.

The preſent ſeaſon, like all others, hath maladies peculiar to itſelf: diarrhœas and the dyſentery are thoſe we have moſt to dread; and the ophthalmy, which is endemic in Egypt, begins to aſſociate itſelf with theſe, in an alarming manner.

ner. This laſt diſeaſe is ſometimes ſimple, and idiophatic; it is then to be conſidered as appertaining to the claſs of ordinary and local inflammations, and is to be treated in the ſame manner. At other times it is concomitant with, or ſymptomatic of diarrhœas, and dyſenteries, and it is moſt likely to follow the ſuppreſſion of thoſe evacuations, which it becomes neceſſary to recall by minoratives.

Perhaps, alſo, in ſome circumſtances, the ophthalmy is to be viewed as a criſis of diarrhœa and dyſentery. In other reſpects, the œtiology of the ſeveral kinds of ophthalmies is ſimple, and may be explained by this axiom, in the theory of fluxes: wherever a point of irritation exiſts, there the humours conſtantly flow.

In addreſſing myſelf to you, citizens-colleagues, relative to our common duties, and the means of rendering ourſelves as uſeful as poſſible to the army, I cannot be too earneſt in recommending the peruſal of Propſer Alpinus *(de medicina Ægyptiorum)*. That eſtimable work points out to each of us the propriety of undertaking a very commendable taſk; this conſiſts in making extracts, in the courſe of which, ſetting aſide a verboſe diction, and exploded theories, that portion only ſhould be preſerved, which appertains to actual

actual obſervation, and the grand practical deductions to be drawn from it. Thoſe extracts might become, as it were, the text of a commentary, in which we could inſert ſuch intereſting facts as might happen to occur in the courſe of our daily practice.

The ſame author hath written another excellent work (*Rerum Ægyptiarum, Libri IV.*), which contains a variety of intereſting details relative to the natural and civil hiſtory of Egypt, as well as the manners, arts, and whatever elſe is likely to become the object of the uſeful labours, I have already adviſed you to undertake relative to medicine.

Our functions with the armies are not confined to the treatment of maladies; we ought conſtantly to attend to whatever can enſure the health of military men, and our duties on this ſubject are ſufficiently detailed in the laws and regulations explanatory of them.

But for the proper application of the principles of the healing art, and, in order to diſcover ſuch medicaments as are efficacious in a country new to us, it is indiſpenſible to draw up a proper deſcription of its topography. This conſideration now induces me to preſent you with an uniform plan, which will be uſeful to you in the claſſification

claſſification of your obſervations; you will eaſily recognize, that with an exception to the local poſitions, this is borrowed from the ſketch which more able hands have drawn up, for the phyſico-medical ſtudy of France.

1°. To examine the nature of the ſoil of the country, of which you wiſh to obtain a knowledge.

2°. To obtain a knowledge of the longitude and the latitude, as alſo of the general expoſure.

3°. What are the prevailing winds.

4°. What are the principal phyſical qualities of the waters of the Nile, of wells, and ciſterns; as alſo their influence on vegetation, and on the health of men and animals.

5°. Of what ſpecies are the trees, the ſhrubs, and the other plants; more eſpecially thoſe employed in either cookery or medicine, that grow in the places here deſcribed.

6°. What are the different kinds of grain cultivated; in what manner are they cultivated; what diſeaſes are they ſubject to.

7°. To examine carefully, and point out the numerous medical ſubſtances that are brought in the courſe of commerce, from Aſia to Africa, and particularly to Egypt.

8°. What are the animals belonging to each claſs,

claſs, that are indigenous in Egypt, and foreign in Europe: you are alſo to collect all poſſible information relative to the maladies of ſuch domeſtic animals as alleviate and participate in the labours of man. And

9°. You are to obtain a knowledge of the general diſpoſition of the inhabitants, their food, drink, clothing; the manner in which their houſes are conſtructed, their occupations, and cuſtoms; the moſt common diſeaſes to which boys, men, girls, and women are ſubject; the uſual method of treating them; at what epoch does menſtruation begin and end; is the fecundity of the females remarkable; what is the uſual extent of life?

Egypt is ſuppoſed to have been the cradle of medicine, as well as of the other objects of human knowledge; but it muſt be allowed that the hiſtory of our art is very uncertain and obſcure. Among the Egyptians it is accompanied with a variety of ridiculous ſuperſtitions, and reaſon has nothing to rely on, except the eſtabliſhment of corporations of phyſicians, whoſe rules being ſufficiently known, preſuppoſe a ſeries of doctrines that muſt have been ſanctioned by ſucceſs. But the epoch, at which an extenſive knowledge of medicine appears likely to

have prevailed, is that, when after the burning of the library of Alexandria, the caliphs relighted at Antioch, at Hharran, and at Bagdad, the torch of learning, by means of the ſignal protection they afforded it. It was then that Hhonaïn tranſlated into Arabic, the Syriac recipes of the Greek phyſicians; and it was by following this example, that in a later time and different places, Rhazes (Al-Rhazy) Abou-l-Kaſis (Khaleſaboul qacem), Avicenna (Ibn-ſyna), A'ly-A'bbas, Meſueh (Meoçouyeh), Aven-Zoar (Aven-Zouhar), and Averroes (Ebn-Rochd), all of them Arabian phyſicians, conſecrated the ſame doctrine in the numerous writings ſtill revered throughout the Eaſt. An intimate acquaintance with their models, added to the progreſs of knowledge, will not permit us to place theſe men among our legiſlators, but we are under great obligations to them for having preſerved the medical ſyſtem of the Greeks: and in this conſiſts their real glory, although they may alſo boaſt of having perfected ſurgery, and in ſome reſpects created pharmacy, by the application of chemiſtry, which they cultivated with ſucceſs. It will not however be conſidered as a merit at the end of the eighteenth century, to have introduced a number of medicaments the luxury of which is ſtill more dangerous than ridiculous.

There muſt ſtill exiſt, and I myſelf have diſcovered traces of this ancient ſcience in Egypt. Study then with attention the practice of the country, however deſpicable the empiriciſm of it may appear to you at firſt ſight: it will be neceſſary to become acquainted with, before we poſſeſs any right to condemn it. Be alſo aſſured, that in a new climate, and indeed every where, even thoſe who poſſeſs but little learning, can teach us much uſeful knowledge.

Our profeſſion, in addition to this, citizens-colleagues, will give you opportunities for obſervation, which do not preſent themſelves to other men. The eaſtern nations, notwithſtanding their prejudices, have always exhibited a great confidence in the phyſicians of Europe; it is this conſideration that hath often induced travellers, who were ſtrangers to our art, but whoſe minds were cultivated by the ſciences, to recur to it, as a title to their eſteem. The ſervices rendered by you, will be far more ſtriking, and you will aſſuredly procure all the information in exchange which you may be deſirous to collect; it is neceſſary for the honour of the human heart to believe, that benefits ſometimes excite gratitude.

The phyſician in chief to the army,

B. DESGENETTES.

REPORT,

Relative to Pompey's Column, read before the Inſtitute, on the 6th Vendemaire, 7th Year,

By Citizen NORRY.

THE ſmall number of admeaſurements hitherto given of Pompey's Column, and theſe frequently ſtated in the moſt uncertain manner by the different authors who have mentioned them, determined the citizens Dutertre, Protin, Le Pere, and myſelf, to aſcertain the various proportions before we left Alexandria. Citizen Dumanoir, the commandant of the port, whom we had requeſted to facilitate the operation, by preparing cordage, &c. on board his ſhip, was eager to ſecond our intentions.

At five o'clock in the morning of the 14th Fructidor, we repaired to this monument accompanied by a guard. We began by letting fly a kite * of about four feet in heighth, to the ſtring of which was faſtened a cord of an indefinite

* The ſame mode was employed a few years before.

length,

length, that was ſeized by one of us when the kite had aſcended above, and paſſed beyond the capital; ſo that by pulling the line it deſcended to the earth, and was inſtantly ſeparated. We thus had a cord ſtretched acroſs the capital of the column, in the ſame manner as if it had been placed around the circumference of a pully. When this firſt operation was completed, a ſecond, of a larger ſize being tied to one of the extremities of the former, and ſubſtituted in its place, a third capable of ſupporting the weight of a man, was immediately attached. A ſailor was then drawn up to the capital; and the firſt thing performed on his part, was to throw down an imitation of a ſtand of colours, formed out of hammered iron, which had been placed there in 1789, by Favel, a French artiſt; on this was marked the total height of the monument, eſtimated at 88 feet, 9 inches. After the ſailor had tied the cordage firmly round the volutes of the angles, and made other neceſſary preparations, I placed myſelf on a ſeat ſuſpended by a rope, and was immediately drawn up. Citizen Protin aſcended ſoon after, and we meaſured the various parts of the capital together; while the citizens Le Pere and Dutertre took the dimenſions of the baſe and pedeſtal. We then eſtimated the total height,

height, which was within 8 centimetres (three inches) of Favel's calculation: it amounted to 28 metres, 73 centimetres (88 feet 6 inches).

Nothing now remained, but to meaſure the diameter of the column, at different heights. To effect this, we had diſpoſed a ſquare, the ſides of which were about five feet in length, with a moveable index, ſliding in a groove, which divided the angle into two, being ſo diſpoſed as to advance, or recede, in order to touch the circumference at each ſtation, where the ſhaft of the pillar was embraced horizontally by the ſquare. In conſequence of this, and by conſidering the hypothenuſe of each of the triangles that determine the different lengths of the index, as ſo many ſides of an octagon, we were enabled to find the various circles inſcribed by theſe octagons, and conſequently their diameters. In order to perform the operation with preciſion, the perſon who made uſe of the ſquare at the different ſtations on the ſhaft, applied the level, which aſſiſted him in placing it horizontally, by lowering or raiſing above the column, the extremities of the two arms of the ſquare, to which cords were appended. By means of this proceſs, we compleated the buſineſs with the greateſt exactneſs. Several members of the Committee of Arts witneſſed

neſſed our proceedings, and the greater part of them afterwards aſcended the enormous capital on which we ſtood to the number of ſix or ſeven.

It now only remains for me to add a few words relative to the diſpoſition, the diviſion, the principal dimenſions, the nature of the materials, the age and the proportions of the monument.

It is ſituated on a gentle eminence, and placed on a baſe, which the barbarians have undermined; a centre of *one metre and twenty-eight centimetres* (four feet ſix inches), in form of a ſquare, ſerves as its ſole ſupport. This centre is formed of the fragment of an Egyptian monument, which appears to be of a ſilicious nature, and muſt have been brought to this place, as the hieroglyphic characters are reverſed. On an attentive examination of the waſte committed beneath the pedeſtal, it is perceived that the rubbiſh, being laid in heaps, has occaſioned the column to lean twenty-one *centimetres* (eight inches); and it is undoubtedly to this cauſe that may be attributed a deep crevice of about four *metres* eighty-ſeven *centimetres* (fifteen feet) in length, at the lower part of the ſhaft.

This monument, which is of the Corinthian order, is divided into four parts, pedeſtal, baſe,

ſhaft, and capital; a circle of two *metres* two *centimetres* (ſix feet three inches) in diameter, and which has experienced a depreſſion of ſix *centimetres* (two inches), gives reaſon to ſuppoſe that there has formerly been a projection on the top for ſupporting, perhaps, the figure of the hero to whom this column had been elevated; but this is merely conjectural.

The pedeſtal is three *metres* twenty-four *centimetres* (ten feet) in height; the baſe, one *metre* ſeventy-eight *centimetres* (five feet ſix inches three-tenths); the ſhaft, twenty *metres* forty-eight *centimetres* (ſixty-three feet one inch three-tenths;) the capital, three *metres* twenty-one *centimetres* (nine feet ten inches ſix-tenths); the diameter of the column is two *metres* ſeventy *centimetres* (eight feet four inches) in the lower part, and two *metres* forty-nine *centimetres* (ſeven feet two inches eight-tenths) near the aſtragal; the total height, as has already been obſerved, is twenty-eight *metres* ſeventy-three *centimetres* (eighty-eight feet ſix inches). The whole of the pillar is formed of Thebaic granite.

Although its order be in ſome meaſure conſidered as Corinthian, on account of its capital, it however does not exhibit the Grecian proportions; thoſe of the ſhaft approach the Ionic. It

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is evident, in other reſpects, that the different members of which it is conſtituted appertain to different ages. The ſhaft is of an admirable galba, and exhibits an excellent poliſh on every ſide, except that towards the deſert, which has ſuffered from the ſands; it appears to have been formed by the hands of the Greeks, perhaps under the Ptolomeys. As to the other parts, they are evidently inferior. The profiles have a near reſemblance to thoſe of the lower empire among the Romans; the capital is only remarkable for the coarſe maſſiveneſs of its form; the pedeſtal is exceedingly low, and the colour of the granite employed there differs from that of the ſhaft.

It may fairly be conjectured, that this ſhaft which was evidently conſtructed before any of the reſt, has been re-erected at ſome extraordinary epoch. It is greatly to be regretted, that an inſcription formerly placed on one of the ſides of the pedeſtal, ſhould be no longer legible; were it not for this, we ſhould be better informed relative to this monument, which ſome authors attribute to the memory of Pompey, and others to that of Septimus Severus.

A MEMOIR

A MEMOIR,

Relative to the Optical Phenomenon, known by the name of MIRAGE.

By Citizen GASPARD MONGE.

DURING the march of the French army through the deſert, from Alexandria to Cairo, we had an opportunity of obſerving a phenomenon daily, that muſt be conſidered extraordinary by the greater part of the inhabitants of France. It is neceſſary for its production, that the ſpectator ſhould be placed in an extenſive plain, wholly, or at leaſt nearly, level; that this plain ſhould be prolonged to the limits of the horizon, and that the ſoil, by expoſure to the ſun, ſhould have acquired a very high degree of temperature. It is ſuppoſable that theſe three circumſtances may be united in the *flats* of Bourdeaux; for their level, like that of lower Egypt, is nearly horizontal; they are not terminated by any mountain, at leaſt in the direction from eaſt to weſt; and it is probable, that during our long ſummer days the arid ſoil of which they are formed

formed may acquire a ſufficient temperature. It is therefore not wholly improbable, but that this phenomenon may be known to the inhabitants of that department; it is familiar to mariners who obſerve it frequently at ſea, and have given it the name of *Mirage*.

In truth, the cauſe which occaſions the *Mirage* in the ocean, may be very different from that which produces it at land; but the effect being the ſame in both caſes, I have not deemed it proper to introduce a new word. I ſhall firſt deſcribe the phenomenon, and afterwards endeavour to give an explanation of it.

The country of lower Egypt is nearly a level plain, which loſes itſelf, like the ſea, in the clouds at the extremity of the horizon: its uniformity is only interrupted by a few eminences, either natural or factitious, on which are ſituated the villages, thus kept out of the reach of the inundations of the Nile; and theſe eminences, leſs uſual on the ſkirts of the deſert, more frequently to be ſeen on the ſide of the Delta, and which appear like a dark line on a very tranſparent ſky, are rendered ſtill further viſible by the date trees and ſycamores, oftener to be met with in ſuch ſituations than elſewhere.

Both morning and evening the aſpect of the country

country is exactly as it ought to be; and between you and the last villages which present themselves, you perceive nothing but land; but when the surface of the earth is sufficiently heated by the rays of the sun, and indeed until it begins to get cold towards the evening, the land no longer seems to have the same extension, but to be terminated, to within the distance of about a league, by a general inundation.

The villages placed beyond that, appear like so many islands stationed in the midst of a great lake, from which the spectator is separated by an extent of land, more or less considerable, according to circumstances. You then behold the image of each of these villages reflected exactly as if it were exhibited on a clear surface of water, with only this difference, that as the representation is at a considerable distance, the smaller objects are invisible, and the masses alone distinct; in addition to this, the edges of the reversed image are rather ill defined, and such as they would be if the surface of the reflecting medium happened to be a little agitated.

In proportion as one approaches a village, which appears to be placed in the midst of an inundation, the margin of the water seems to recede, and the arm of the sea, separating you as

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it were from the village, ſhrinks back by degrees: it at length diſappears entirely, and the phenomenon which now ceaſes, in reſpect to the firſt village, is inſtantly reproduced by a new one, which you diſcover at a due diſtance in the rear. Thus every thing contributes to complete an illuſion, which is ſometimes cruel, more eſpecially in the deſert, becauſe it tantalizes you with the appearance of water, at a time when you experience the greateſt want of that element.

The explanation which I propoſe to give of the *Mirage*, is founded on ſome of the principles of opticks, that, indeed, apply equally to all the elements, but which it may be, perhaps, proper to explain here.

When a ray of light traverſes a tranſparent and uniform medium, its direction is in a ſtraight line. When a ray paſſes from a tranſparent medium into another the denſity of which is greater, if its direction in the firſt be perpendicular to the ſurface that ſeparates it from the two *media*, this direction will not experience any alteration, that is to ſay, ſo long as the right line which the ray forms in the ſecond medium, is a prolongation of that followed in the firſt. But if the direction of the incidental ray makes an angle with the perpendicular at the ſurface:

1°. The

1°. The ray will divide in its paſſage in ſuch a manner, that the angle which its forms, with the perpendicular in the ſecond medium, becomes ſmaller; And

2°. In reſpect to the two *media*, whatever may be the extent of the angle which the incidental ray forms with the perpendicular, the ſinus of this angle, and that of the angle of the refracted ray, are always in a correſpondent *ratio*.

But the ſinus of a large angle does not encreaſe ſo rapidly as that of a ſmall one. When the angle, therefore, that is formed by the incidental ray, and the perpendicular happens to encreaſe, the ſinus of the angle, formed by the broken ray, encreaſes in the ratio of the ſinus of the former, and the encreaſe of the angle itſelf, is leſs than that of the angle of the incidental ray. Thus, in proportion as the angle of incidence augments, the angle formed by the broken ray augments alſo, but always by little and little; ſo, that when the angle of incidence hath arrived at its largeſt dimenſions, that is to ſay, when it is within an infinitely ſmall ſpace of 90°, the angle which the broken ray makes with the perpendicular, is leſs than 90°: this is a *maximum*, or, in other words, no ray of light can paſs from the

first medium into a second, under a greater angle.

When the ray of light passes on the contrary, from a denser medium into one less so, it exactly follows the same line as in the first case, but in a contrary direction; that is to say, if in the dense medium it has the same direction as the broken ray in the first case, it divides at the surface, and assumes the direction which has been also followed by the incidental ray.

In consequence of this it may be inferred that on the passage from a more to a less dense medium:

1°. If the ray of light be comprehended between the perpendicular and the direction of the diverging ray which constitutes the *maximum* angle; this ray will project into the less dense medium.

2°. If the ray of light possesses the same direction as the diverging ray, the angle of which is the *maximum*, it will again issue forth, by making an angle of 90° with the perpendicular, or by remaining in the plane, which serves as a tangent to the surface. But if the angle which the ray of light forms with the perpendicular, be greater than the *maximum* of the angle of refraction, or what amounts to the same, if the ray be compressed

preſſed between the ſurface and the diverging ray, the angle of which is the *maximum*, it will not leave the denſe medium; it will reflect itſelf to the ſurface, and re-enter the ſame medium, by making the angle of reflection equal to the angle of incidence, theſe two angles being in the ſame plane, perpendicular to the ſurface. It is on this laſt propoſition that the explanation of the *mirage* is principally founded.

The tranſparency of the atmoſphere, that is to ſay, the faculty which it poſſeſſes of allowing the rays of light to paſs through with rapidity, does not permit it to acquire a very high degree of temperature by its direct expoſition to the ſun alone; but when, after having traverſed the atmoſphere, the light becoming extinguiſhed by an arid ſoil, that ſerves only in a very ſmall degree as a conductor, hath conſiderably warmed the ſurface of this earth; it is then that the inferior *ſtratum* of the atmoſphere, by its contact with the heated ſurface of the ſoil, contracts a very high degree of temperature.

This *ſtratum* dilates itſelf; its ſpecific weight diminiſhes; and in conſequence of the laws of hydroſtatics, it elevates itſelf, until by becoming cool, it hath recovered a denſity equal to that of the ſurrounding element. It is then ſucceeded by

by the *ſtratum* immediately above it, through which it paſſes, and the other ſoon experiences a ſimilar operation. Thence is produced a continual efflux of rarified air, always elevating itſelf through a denſer medium, that in its turn experiences a depreſſion; and this efflux is rendered ſienſible by the *ſtriæ*, which alter and agitate the images of fixed objects that are ſituated beyond them.

In our European climates, we are acquainted with ſimilar *ſtriæ*, produced by the ſame cauſe; but they are not ſo numerous, and do not poſſeſs ſuch an aſcenſional rapidity as in the deſert, where the altitude of the ſun is greater, and the aridity of the ſoil, by depriving it of evaporation, does not permit any other employment of the *caloric*.

Thus towards the middle of the day, and during the greateſt degrees of heat, the *ſtratum* of the atmoſphere, in contact with the ſoil, is of an evidently leſs degree of denſity than the *ſtrata* immediately above it.

The brilliancy of the ſky proceeds merely from the rays of the ſun being reflected in every direction by the tranſparent *moleculæ* of the atmoſphere. Such of the rays of light as are tranſmitted by the more elevated part of the ſky, and which deſcend to the earth after making a conſiderable angle

with the horizon, take a new direction on entering the inferior dilated *ſtratum*, and encounter the element on which we live, by means of a much ſmaller angle. But thoſe that proceed from the lower parts of the ſky, and form ſmall angles with the horizon, when they reach the ſurface which ſeparates the inferior and dilated *ſtratum* of the atmoſphere, from the more denſe ſtratum above, are unable to leave the latter; in conformity, therefore, to the principle of optics already alluded to, they reflect themſelves in an aſcending direction, by making an angle of reflection equal to the angle of incidence, as if the ſurface which ſeparates the two *ſtrata*, conſtituted a mirror; and they then repreſent to the eye placed in the denſe *ſtratum*, the inverted image of the lower parts of the ſky, which appear as if below the real horizon.

In this caſe, if you were not advertiſed of your error, as the repreſentation of that part of the heavens perceived by means of reflection, is almoſt of the ſame brilliancy as that ſeen directly, you would imagine that the ſky was greatly prolonged, and far nigher than it really is.

If this phenomenon were to occur at ſea, it would alter the altitude of the ſun, taken by an inſtrument, and augment it in the *ratio* of the quantity

quantity of the apparent limit of the horizon depreſſed.

But if ſome terreſtrial objects, ſuch as villages, trees, or little hills, give you notice that the limits of the horizon are more diſtant and that the ſky is not really ſo near, (as the ſurface of the water is not uſually viſible under a ſmall angle, but by the image of the ſky which it reflects,) you will perceive the repreſentation of the ſky, and imagine that you behold a ſuperficies of reflecting water.

The villages and trees that are at a proper diſtance, by intercepting a portion of the rays of light tranſmitted by the lower regions of the heavens, occaſion ſo many voids in the image of the ſky, produced by reflection. Theſe voids are wholly occupied by the inverted images of the ſame objects, becauſe ſuch of the rays of light as are tranſmitted by them, and which form angles with the horizon, equal to thoſe conſtituted by the intercepted rays, are reflected back in the ſame manner as thoſe would have been. But as the reflecting ſurface which ſeparates the two *ſtrata* of air, of different denſities, is neither perfectly level, nor perfectly motionleſs; the laſt images will, of courſe, appear badly defined, and agitated towards the edges, like thoſe produced

by the ſurface of water which may have contracted ſlight undulations.

It is eaſily to be diſcovered why this phenomenon cannot take place when the horizon is terminated by an elevated chain of mountains; for thoſe mountains intercept all the rays of light tranſmitted by the lower parts of the ſky, and only allow thoſe to paſs above them which form ſufficiently large angles with the dilated ſurface, to prevent the reflection from taking place.

In an uniform ſtate, that is to ſay, by ſuppoſing that the denſity and thickneſs of the dilated *ſtratum* are conſtant, and the temperature of the ſuperior *ſtratum* invariable, the greateſt poſſible angle under which the rays of light could be thus reflected, would be determined with preciſion: for the largeneſs of this angle depends entirely on the immediate connexion between the ſinus of the angles of incidence and reflection for the two *media*. But of all the rays reflected, thoſe which form the greateſt angle with the horizon, appear to iſſue from the neareſt point to that where the phenomenon commences.

In an uniform ſtate then, the point at which the phenomenon commences is always at a certain diſtance from the obſerver: accordingly, if he ſhould happen to advance, the ſpot at which the

the inundation ſeems to begin, appears to advance alſo in the ſame direction, and with the ſame celerity. If the line of march ſhould, therefore, be directed towards a village, which appears to be ſituated in the midſt of the inundation, the limits of the inundation will ſeem to recede inſenſibly from this village, and are ſoon after ſeen to ſtretch beyond it.

When the ſun is near the horizon at his riſing, the earth cannot have been ſufficiently warmed; and at his ſetting, it has become too cold for the phenomenon of the *mirage*. It then appears to be extremely difficult to perceive both a direct and reflected image of the ſun, on account of the elevated temperature of the inferior *ſtratum* of the atmoſphere. But during the ſecond quarter of the moon, that planet riſes in the afternoon, a time when circumſtances are more favourable to the *mirage*. If it then happens that the brilliancy of the ſun, and the clearneſs of the atmoſphere, ſhould permit the moon to be diſcerned at her riſing, two images of that planet will be obſerved, one above the other, in the ſame vertical line. This phenomenon is known by the name of *paraſelene*.

The tranſparency of the ſea allows the rays of the ſun to penetrate to a conſiderable depth; its

ſurface from its expoſition does not, however, become near ſo warm as an arid ſoil in the ſame circumſtances; it cannot communicate, therefore, to the ſtratum of air that repoſes upon it ſo elevated a temperature; and on this account, the *mirage* is not ſo common at ſea as in the deſert. But the elevation of the temperature is not the ſole cauſe, which under a conſtant preſſure, may dilate the inferior ſtratum of the atmoſphere. In fact, the air poſſeſſes the faculty of diſſolving water, ſo far, even, as to attain the point of ſaturation without loſing its tranſparency; and Sauſſure hath proved that the ſpecific weight of the air decreaſes in proportion to the quantity of water kept in diſſolution. When, therefore, any wind at ſea is not impregnated with water, the inferior *ſtratum* of the atmoſphere, which is in contact with the ſurface of the ocean, diſſolves water anew, and thus becomes dilated. This cauſe, added to the ſlight augmentation of the temperature may, however, produce a ſtate of things favourable to the *mirage*, which mariners, indeed, frequently obſerve.

This laſt cauſe, or in other words, the dilatation of the inferior *ſtratum* of the atmoſphere, occaſioned by the diſſolution of a large quantity of water, may take place every moment of the day,

day, as well when the ſun is near the horizon, as when he approaches the meridian. It is poſſible that a *parhelion* might then be produced, a phenomenon in conſequence of which, either at the riſing or ſetting of the ſun, one beholds two images of that luminous body above the apparent horizon at the ſame time. But I never had occaſion to obſerve this latter phenomenon, which is very unfrequent, or to remark the circumſtances that accompany it. I therefore propoſe this latter explanation with a certain degree of reſerve, and merely with an intent of furniſhing the means of making uſeful obſervations.

Addition.

Since reading the above memoir, I have had frequent opportunities of obſerving the *Mirage* at land; this has occurred in various ſeaſons, as well as under different circumſtances; and the reſult, even including the minuteſt details, has always been in conformity to the explanation already given by me. Of all theſe obſervations, there is one only, the relation of which may prove uſeful here.

I was along with General Bonaparte in the valley of Suez, when he diſcovered the canal that formerly united the Red Sea with the Mediterranean. This valley, which is ſome leagues in

length, is bounded on the eaſt by that chain of mountains that extends from Syria to Mount Sinai; and on the weſt, by the mountains of Egypt. Theſe mountains are in general ſufficiently elevated to exclude the rays of light tranſmitted by the inferior parts of the ſky, and ſuch of the rays as are not thus intercepted, reach the earth under too large an angle to be reflected by the inferior dilated *ſtratum* of the atmoſphere. Thus in the hotteſt part of the day one does not perceive the reflected ſurface of any portion of the ſky, nor is the appearance of an inundation any where to be ſeen.

Notwithſtanding this, the effect of the *Mirage* is not entirely loſt; the viſible objects placed generally on an aſcent, whoſe poſition correſponds with the inferior parts of the ſky, the image of which reflects itſelf, participates in the effect, although in a leſs ſtriking manner, on account of their ſmall extent, and alſo with leſs force, becauſe the colour is far more obſcure than that of the ſky. Independently of the repreſentation produced by the direct rays of light, the rays which have emanated from theſe objects, and are directed towards the earth, become reflected by the inferior *ſtratum* of the air, in the ſame manner as the rays proceeding from the inferior

inferior parts of the atmoſphere, of which they occupy the place: thus producing a ſecond image of theſe objects inverted, and placed vertically above the former.

This *duplication* of images produces optical illuſions, againſt which it is proper to be on our guard in a deſert that may be occupied by an enemy, while no one is at hand to give information relative to ſuch alarming appearances.

I ſhall take advantage of this opportunity to mention another optical phenomenon, which is not ſufficiently intereſting to be made the ſubject of a particular memoir.

During our return from Egypt, when we approached the European climates, one morning a few minutes after ſun-riſe, the ſky was clear towards the eaſt; it rained at the ſame time in a weſtern direction, and we beheld two ordinary rainbows; the one, interior, produced by a ſingle reflection of the rays of light within the ſpace where the rain fell; the other, exterior, occaſioned by two reflections. At this moment both the ſea and the atmoſphere were perfectly calm, and the ſurface of the water, which was very ſmooth, reflected the image of the ſun in a very diſcernible manner. This reflected image alſo gave riſe to two other rainbows. The two firſt men-

mentioned, which were produced by direct and deſcending rays, formed ſegments leſs than half the circumference; the two others, occaſioned by the reflected and aſcending rays, on the contrary, preſented ſegments greater than 180°. Of theſe four ſimultaneous rainbows, the analogous ones had the ſame baſis, and diverged like two ſegments of the ſame circumference of a circle, which had reverted on their common chord.

This phenomenon is only remarkable on account of the circumſtances which gave riſe to it; and it is ſufficient to have mentioned it here*.

* The Arabs call this phenomenon *al-beidhat* the plural of *al-beidah*, the light, the ſplendor. (L—s.)

OBSER-

OBSERVATIONS

On the Wing of the Oſtrich;

By Citizen GEOFFROY.

THE Oſtrich, *Na'ameh*, in Arabic, inhabits the deſerts of Africa: it is common alſo in the mountains ſituated to the ſouth-weſt of Alexandria. This is a bird known in very ancient times, and which has given riſe to many attempts at the marvellous, by attributing to it the faculty of digeſting iron, and of hatching its eggs by placing them in the ſand.

Its gigantic height, and aſtoniſhing conformation, have more juſtly attracted the attention of naturaliſts. They have been ſtruck in an eſpecial manner with a certain analogy between it and the camel: the oſtrich, like him, repoſes his cumbrous maſs on certain bare and callous ſubſtances; it is the ſole of all the numerous tribe of birds which poſſeſſes but two toes to each foot; and this freſh mark of reſemblance with the camel, is one of the moſt ſingular facts relative to its conformation.

But

But the oſtrich appears to appertain to quadrupeds, by other and no leſs important affinities: the male poſſeſſes the virile member, and the female has a clitoris, parts which are wanting in nearly all other birds; it never leaves the earth; like the quadrupeds, it is condemned, as it were, to traverſe the ſurface with difficulty; and it is undoubtedly a very remarkable thing to ſee aſſociated along with the inhabitants of the air, thoſe nimble beings, for which motion appears to be abſolutely neceſſary, both as a want and as a pleaſure—a clumſy, heavy animal, preciſely deprived of the principal prerogatives which diſtinguiſh and characteriſe its kind.

But it is ſtill more ſurpriſing, that theſe derogations from a general law do not proceed from either the modification or degradation of a ſingle member; if the oſtrich does not aſcend like other birds, this is not the fault of one or two, or even of three qualities, in the organs of flight, but becauſe it is completely deprived of all the inſtruments deſtined for this exerciſe. Between the viſible external parts of the wing, and the internal organs which appertain to it, there exiſts, in fact, a ſtriking relation, which has hitherto eſcaped the notice of the curious, as the diſſections made by them have been undertaken merely

merely with the view of obtaining a knowledge of the *viſcera* of the oſtrich.

The anterior extremities of this ſpecies, ſeem to induce me to believe, that nature hath, in ſome meaſure, propoſed to create a bird, in which the organs of flight ſhould be altered and modified to that degree, ſo as to be nearly entirely effaced; and as the figure of this animal is in part conſtructed after that of quadrupeds, with this difference, that a certain number of organs, and particularly the legs, are appropriated to flight, one is led to think, that in the formation of the oſtrich nature hath fallen into a manifeſt contradiction. Let us not be eager however to blame ſo ſtrange an anomaly; we ought firſt to learn how ſhe has deviated from her ordinary road, and what are the means ſhe has recurred to upon this occaſion.

In order that the diſcuſſion of this queſtion may be more eaſily undertaken, and that the difference between the anterior extremities of the oſtrich and thoſe of birds in general, may be more readily underſtood, I ſhall here preſent a deſcription of theſe organs in quadrupeds; I ſhall afterwards examine them in reſpect to birds, and finally deſcribe them in the oſtrich.

The organs of running, or of flight, both in a qua-

quadruped and a bird, are compoſed of three principal parts: the arms or wings, the muſcles which put theſe in motion, and the bone to which the muſcles are attached. In men and monkies, who ſcarcely ever make uſe of their anterior extremities, but for the purpoſe of taking hold of ſomething, and in quadrupeds, who uſe them for the purpoſe of motion, the points of fixation are incapable of affording any other than a middling, while the muſcles poſſeſs but a ſmall degree of ſtrength and thickneſs: accordingly the *ſternum* is cartilaginous in this family, and the pectoral muſcle ſmall. Nevertheleſs, ſo far as the efforts of the anterior extremities of theſe animals are concerned, the muſcular fibres, and their appendages, are more than ſufficient for that purpoſe.

It is not, however, the ſame in reſpect to birds, deſtined to ſkim through a very thin and light element, and with whom the anterior extremities perform the office of oars; now, in order that theſe oars may be enabled to agitate a greater maſs of air, they ſtand in need of a greater degree of extenſion; thence proceeds the very great length of the anterior extremities of birds. So long a lever, intended to act on a light fluid like the atmoſphere, requires, in its turn, a great moving

ing force, and the pectoral muſcle is accordingly exceedingly thick and ample. Moreover, it becomes neceſſary that the *ſternum* ſhould be enabled to receive a muſcle of ſo large a ſize, in a proportionate receptacle, and alſo to furniſh it with very ſtrong appendages: the *ſternum* of birds is, therefore, ſo broad as to cover three parts of the belly. It is alſo entirely oſſified, and towards the middle there is a conſiderable riſing which traverſes it in a ſtraight line, and is known by the name of the *brechet*, or briſket. The muſcle fills up the fiſſure which this projection forms on the *ſternum*, while its hinder parts are attached in a ſolid manner to the *brechet*.

A bone, with which there is no analogy among quadrupeds, is called by the French the *fork*, and by the Engliſh, the *merry-thought*; it is in form of a V, and is placed before the *ſternum*; the uſe of it is to prevent the wings when lowered, from approaching one another and thus compreſſing the breaſt.

In ſhort, that nothing relative to the mechaniſm of flight may be omitted, I ſhall here point out the chief difference between the ſyſtem of reſpiration in birds and quadrupeds. The lungs, inſtead of being freely ſuſpended in a bag, as in quadrupeds,

quadrupeds, are adherent to the ſides in birds, without any particular envelope, being pierced with holes, each of which opens either into a pouch or veſicle; the whole of the abdomen is full of theſe veſicles, which, by being inflated, conſiderably augment the volume of the bird, and thus render it ſpecifically lighter.

If we proceed to the examination of the peculiarities preſented by the oſtrich, we ſhall obſerve:

1°. That its anterior extremities are far more ſhort, in proportion, than in other birds.

(There is another ſpecies which, as well as the oſtrich, never forſakes the earth: this is the caſſiowary, in which this fore-ſhortening is ſo very conſiderable, that no veſtige of a wing appears on the outſide. The form is not, however, entirely ſuppreſſed, for the various parts are found below the ſkin).

2°. The ſternum of the oſtrich is extremely ſmall; it forms nearly the ſixth part of the length of the trunk; it is deſtitute of the *briehet*, and is always found completely oſſified, and even pretty thick: this great degree of ſolidity is employed to ſupport one of the two calloſities on which the animal ſupports itſelf when in a ſtate of repoſe.

The ſecond calloſity is inſerted at the *os pubis*, which, on this account, is prolonged conſiderably before.

3°. The pectoral muſcle is ſtill ſmaller than the ſternum; it ſcarcely covers the third part of it: the middle of the ſternum is filled with fat, which forms a cuſhion, as it were, for the anterior calloſity.

4°. The air-veſicles, or portions of the lungs, are conſiderably reduced both in reſpect to number and capacity.

5°. It will be readily perceived that the oſtrich ſtands in no need of what is commonly called the *merry-thought*, or that bone in form of a V, which is deſtined to prevent the wings from cloſing during violent movements. Nevertheleſs, this bone exiſts; but being divided towards the lower part, it is uſeleſs; each of its arms is joined by means of its anterior extremity with the bone, which is compoſed of the clavicule and the omoplate, or ſhoulder-blade.

Although uſeleſs in the preſent caſe, thoſe rudiments of the *merry-thought* have not been ſuppreſſed, becauſe nature never proceeds by rapid ſtrides, and always leaves the veſtiges of an organ, even when it is ſuperfluous, provided this organ has acted an important part in the other ſpecies of the ſame family. Thus the veſtiges of the wing of the caſſiowary are to be found beneath the ſkin that covers the ſides; thus, alſo, at the internal angle

of the human eye, there is a ſwelling of the ſkin which we recognize as the rudiments of the *nictant* membrane, with which many quadrupeds and birds are provided.

6°. I ſhall not add any thing to what is already written relative to the plumage of the oſtrich; it has been judiciouſly obſerved, that all the feathers are of the ſame kind; that their beards or filaments conſiſt of detached threads, without either reciprocal conſiſtence or adheſion, and that the quills which compoſe the wing, far from being able, like thoſe of other birds, to act in concert for the purpoſe of agitating the air, conſiſt of longer and more ſlender filaments than the others. The plumage of this bird is the object of a conſiderable traffic, and when tranſported into Europe, is employed in diſtinguiſhing the gradations of military rank, and adorning the heads of females.

I ſhall not enumerate any more of the obſervations which the wing of the oſtrich might give riſe to: the narrow limits of this paper render it incumbent on my part to come to a ſpeedy concluſion; and in addition to this, I deem what I have already ſaid ſufficient to demonſtrate the two facts intended to be eſtabliſhed:

1°. That if the oſtrich be reduced, in reſpect to

to motion, to the condition of quadrupeds, the cauſe is not to be attributed ſolely to the ſhortneſs of the wings, and the ſtate of the plumage, but to all the organs, either employed directly or indirectly in flight, which are modified together, and as if it were in concert, ſo as to deprive it of the moſt charming prerogative appertaining to birds. And,

2°. That whatever modifications the organs of flight may have undergone, theſe are not ſo important but that the bird is ſtill recognizable, by certain indications of the general plan conſecrated to this family.

561680

OBSERVATIONS

On the Arabian Horſes of the Deſert.

THE horſes of the Arabian race have been, at all times, diſtinguiſhed on account of their excellent qualities, and admirable figures. They are generally eſteemed throughout Aſia; but there are certain tribes in the deſert, in poſſeſſion of the fineſt breed: theſe are the Arabs who live on the banks of the Euphrates, and the Tigris, between Bagdad and Buſſorah. The Cheykhs take great care to preſerve theſe races uncontaminated, and without alteration.

The horſes are divided into two claſſes; the nobles, and the plebeians: the latter are croſſed in a variety of different manners, and form the moſt numerous ſpecies; but it is not intended to mention any other than the firſt. And here it will be neceſſary to make an obſervation on a ſingular cuſtom, which appears in ſufficient conformity with experience; it is, that the genealogy of the Arabian horſes is tranſmitted by females alone: the nobility of the male is only individual.

The Arabs are accuſtomed to ſay, "ſuch a mare

mare is the produce of ſuch another mare;" and they are at great pains to prevent the breed from being adulterated.

When the mares are in heat, they take care they ſhall be covered by ſtallions whoſe deſcent is well known; and when they are ſent to graſs, they are carefully tethered. No ſooner is a foal produced than the chiefs atteſt the fact, by means of a patent drawn up in due form, and ſigned by ſeveral witneſſes. That of the male, as we have already obſerved, does not paſs to his deſcendants; but that of the female makes mention of all her maternal progenitors. This certificate always accompanies the ſale.

There are four diſtinguiſhed races of the Arabian horſes in the neighbourhood of Bagdad, the names of which I have forgotten. There is ſome difference in their form, which, of courſe, does not eſcape the notice of the jockies: as for them, they have no manner of occaſion to peruſe patents, in order to diſcover either if a mare be noble, or from what ſteed ſhe comes.

The Arabs wean their colts after having ſucked fifty or ſixty days. When produced in towns, or when the proprietor is not deſirous to rear them himſelf, the females are ſent among the inhabitants of the deſert. The uſual mode of bargain-

ing on this occaſion is, in their language, to give one foot of the mare, and ſometimes two, or in other words, they pay to the perſon who has had charge of her, a quarter, or even one half of the value, according to an eſtimate made by experienced judges.

The Arabs carry on a great trade in horſes; they ſell them at two or three years old, and for the moſt part keep the mares, from which they derive conſiderable profit. It is alſo pretended that they prefer theſe, becauſe they do not neigh, which would diſcover them during their nocturnal expeditions. The princes never mount any other; the Turks, on the contrary, make uſe of ſtone-horſes alone.

The traffic in horſes is not confined to ſtrangers; they carry on a ſpecies among themſelves which is ſingular enough, for they ſell the *future produce*, without entirely alienating the poſſeſſion. In conſequence of this bargain the whole appertains to the purchaſer, except the firſt filly, which reverts to the ſeller, but the former has ſtill a certain claim on this firſt mare, as has alſo the ſeller on her firſt filly, ſo that theſe pretenſions are continued for ages.

The Arabs begin to place the ſaddle on the colt at the age of fifteen or ſixteen months; and

it

it is never taken off after this, even during the night.

The ſtirrups, conſtructed in form of an oblong ſquare, are about a foot in extent, and a little convex; they never hang lower than the belly, which prevents the animals from lying on one ſide.

They ſoon after experience another conſtraint, being obliged to ſubmit to a ſnaffle, which is fixed pretty near the pommel of the ſaddle, to accuſtom them to hold their heads in almoſt a perpendicular direction; they are then left in this ſituation, during the whole of the day. It is alſo, perhaps, for the ſame reaſon that the manger is conſtructed both high and deep.

The Arabian horſe is neither accuſtomed to hay, nor uſed to the manner in which it is diſtributed in Europe; his food conſiſts of from five to ſix pounds averdupois of barley, which is given at ſun-ſet. This cuſtom renders him patient and indefatigable during the whole of the day. While kept under cover, he is permitted to amuſe himſelf with a little cut barley ſtraw.

It follows from what I have firſt ſaid, that an Arabian horſeman, carrying ſixty pounds of barley behind him, can traverſe the deſerts during the

ſpace of ten days. A few dates, and ſome pounds of wheaten meal, which he converts into bread conſtitute his ſole food: theſe are carried by him in either a leathern or wooden box. Another of theſe, paſſing under his belly, and attached to the two ſkirts of the ſaddle, ſatisfies the thirſt of both man and horſe.

The Arabs, before they are two years old, begin by making their children mount their horſes: they are perfectly well acquainted with them, as they are all brought up together under the ſame tent. They give them but two paces: the walk, and the gallop. They alſo cut the mane and ſhave the tail, that theſe may become more buſhy.

The ſaddle neceſſarily leans forward, on account of the poſition of the horſeman, whoſe ſtirrups are very ſhort; they differ greatly, in this particular, from the Mamelukes of Cairo, and but little from our own light cavalry. It does not belong to me here to decide what kind of ſaddle affords the firmeſt ſeat to the horſeman; but, on examining the arms of the Arabs of the deſert, it would appear that the manner in which they ſit is advantageous. They make uſe of javelins, which they keep underneath their thighs,

of

of lances, and of ſabres. The management of theſe obliges them to be ſeated high, in order to uſe them to advantage.

The Arabs, as every one knows, make war both by attack, and flight. Their poſition in the ſaddle affords them an opportunity of leaning over the neck of the mare, to avoid the lance and javelin. They accuſtom them to gallop at full ſpeed, and to ſtop all of a ſudden, in order to wheel about with celerity, and dart the pike at the enemy. One of the greateſt recommendations in theſe horſes, being to know when to retire at the proper moment, they purſue them while young, with the lance at their poſteriors, and they are ſo much accuſtomed to this management, that when they perceive a horſeman near them, it is only neceſſary to let go the bridle, in order to be out of ſight in an inſtant.

The lance of the Arabian horſeman is formed out of Chineſe bamboo, knotty, light and elaſtic, about twelve feet in length, terminating in an iron point well tempered, and ſurmounted by a tuft of ſilk: it is not immoveable in their hands, as it was formerly in thoſe of our ancient warriors; when they attack, they hold it within one third

of

of the end, and allow it to glide along through their hands, without quitting it, however.

The Arab is ſo nimble that he will mount his horſe, with the aſſiſtance of his ſpear alone.

Theſe people have a moſt excellent cuſtom, by means of which they preſerve the feet of their cattle: when they have rode any diſtance, and the animal is in a perſpiration, they never tie him up until he has been walked backwards and forwards, by a perſon holding the bridle, for a quarter of an hour; they afterwards leave him faſtened to the ſaddle for an hour or two longer, before they give him any thing to eat.

The Arabs have a particular knack at making their mares conceive: when they perceive that they are beginning to be in heat, they mount them two or three days running, in order to fatigue them, and alſo diminiſh their ration of corn at the ſame time, with a view of rendering them feeble; in this they conform themſelves to the opinion of Buffon: that naturaliſt ſuppoſes the females, which are the leaſt vigorous, to be the beſt breeders.

The Arabs keep their ſtallions for the mares, and they conſecrate thoſe of from four to five years old to that purpoſe alone. They do not,

in

in general, employ ſaddle horſes on this occaſion, as they become unruly in conſequence of it.

The Arabs prepare the mare before they bring forth the ſtallion: after having tied her by the feet, and taken off her hind ſhoes, the farrier takes a bit of ſoap, which he introduces into the vagina; he anoints it with this as deep as poſſible, and alſo ſets the entrance of the matrix ſtraight, ſhould he perceive it to wind. I have been aſſured of a fact, which I cannot yet believe: it is, that when they find a mare to be barren, they even remove the matrix out of the vagina, ſcrape the ſmall black points which they perceive there, and ſometimes actually ſow up little holes. As ſoon as the ſtallion has left the female, they immediately throw a bucket of water over the hind parts, and make her gallop, by means of a perſon who runs along with the halter.

It is eaſily perceptible at the end of three or four months, whether the mare be in foal. Here follows an account of what I myſelf have ſeen practiſed: the flank of the animal is preſented to the ſun, and when it becomes warm, cold water is thrown over the belly, and thighs; and the contraction experienced by the mother, in conſequence of this operation, being transferred to the matrix, cauſes the fœtus to move.

Every

Every Arab poſſeſſes a horſe, which he maintains at a trifling expence. The price varies according to the quality; the plebeians are ſold at, from fifty French livres, to one hundred and twenty a piece, while young; thoſe of diſtinguiſhed birth, at from one thouſand, to ten thouſand livres. In reſpect to the mares, which are always one third dearer than the ſtallions, thoſe conſidered as very valuable are never diſpoſed of entirely, as the proprietor always takes care to ſtipulate for the reſervation mentioned above.

Such of the Arabian horſes as are kept in towns, diſplay much grace and elegance: thoſe of the deſert have an humble air, and are very lean: a well fed animal would not be of any ſervice to his maſter, during a long and perilous expedition.

Lightneſs and celerity in running, of courſe, conſtitute a grand difference in reſpect to their cattle; but notwithſtanding all the fables, and vaunting of the natives, they do not poſſeſs the ſame quickneſs of motion as the race-horſes of Europe: theſe traverſe an extent of ground equal to two thouſand yards in the ſpace of four minutes, which is tantamount to three-fourths of the flight of the ſwallow.

The height of the Arabian courſers is not ſo great,

great, in general, as thoſe of the French; but it is more uniform: they greatly reſemble the cattle of the Limouſin, in every thing but the hind quarters, which are more plump.

The Arabian horſe is remarkable for the ſmallneſs of his hoof, and the ſoundneſs of his legs. He is to be found of all colours, black only excepted.

Account

Account of the prevailing

OPHTHALMIA OF EGYPT,

By Citizen BRUANT,

*Phyſician in Ordinary to the Army.**

Head Quarters at Cairo,
15th Fructidor, 6th Year.

ALL the travellers of the medical profeſſion, who have written on Egypt, have ſpoken of the ophthalmia (inflammation in the eyes), ſo frequent in this country, in a vague and inaccurate manner: and yet this diſorder, which is always troubleſome, is often followed by ſerious conſequences, and to this cauſe alone is to be attributed the frequency of blindneſs throughout Egypt.

In the inflammation of the eyes, which is now prevalent in our army, we have not been able to diſcover any eſtabliſhed facts, capable of regulating our treatment of this diſorder. Our practice has, hitherto, been merely founded on the actual

* This account is taken from the correſpondence of Citizen Deſgenettes, principal Phyſician to the army.

ſtate

ſtate of the patient, the previous circumſtances of the diſorder, or ſometimes ſimply on the general indications of the *juvantia* and *lædentia*, in ſimilar circumſtances.

The greater part of our patients affected with this inflammation, have come from the advanced poſts and encampments; all of them have been more or leſs expoſed to the united action of exceſſive heat and light, which may be here regarded as one of the principal cauſes of this diſorder. To theſe may be added others no leſs powerful, among which the chief is, as Proſper Alpinus has obſerved, that ſcorching nitrous duſt which the winds are conſtantly raiſing in clouds in the atmoſphere. All theſe cauſes unite in making the ball of the eye a center of irritation, and conſequently of inflammation. As the operation of theſe prediſpoſing cauſes is conſtant, and varies little at any ſeaſon of the year, the diſeaſe which they produce prevails at all times, but principally during the three months which precede the inundation of the Nile, at which time the neceſſary labours of agriculture fully employ the inhabitants, and expoſe them more directly to the influence of the circumſtances which I have juſt mentioned. Hence it is that the ophthalmia is at that ſeaſon but little to be found

found among the natives, whilſt it attacks our ſoldiers in great number, who are obliged to make laborious marches, or who live in camps diſadvantageouſly ſituated.

The greater number of the inſtances of ophthalmia which come under our care, originate from local circumſtances of this kind; there are, however, others produced by more remote and general cauſes of diſeaſes; as for example, we have met with ſome that evidently originated from a load of acrid bilious ſordes in the primæ viæ. Theſe are not eaſily diſtinguiſhable from the others, for often the ſymptoms of foulneſs of ſtomach are at firſt obſcure, and do not aſſume a decided character till after the operation of an emetic: the moſt certain indications of inflammation of the eyes from this affection of the ſtomach are, an irregular headach, a thirſt more or leſs conſtant, and a yellowneſs in the tongue and inflamed parts.

Again, there is a third ſpecies of ophthalmia which we have remarked, and which will not range under either of the two former kinds, that principally attacks perſons of a delicate habit; thoſe who are weakened by a long continuance of ſickneſs, and are only convaleſcent, and theſe are often thereby detained for a long time in the hoſpital.

hoſpital. In theſe ſpecies of ophthalmia the inflammatory ſymptoms are but indiſtinctly marked, there is little or no ſwelling; but a number of nervous ſymptoms are to be obſerved, ſuch as violent ſpaſms in the eyelid and the parts contiguous to it, which cauſes a great encreaſe in the ſecretion of tears. The eye itſelf, is at the ſame time highly ſuſceptible to light, and the eyelids ſtrongly approach each other.

Theſe differences in the ſymptoms and prediſpoſing cauſes, it is obvious, muſt conſiderably modify the diagnoſis in this diſeaſe. In general, however, it may be deſcribed in the following manner: it comes on all at once, and during a ſtate of perfect health, it begins by a ſharp pain in the eye, accompanied with much watering; the eye ſupports the light with difficulty; ſoon after the veſſels which ſurround the tunica conjunctiva ſwell, and render the motion of the eyelids painful and difficult. As the diſorder advances, the conjunctiva itſelf, ſwells and becomes puffy; it riſes above the tranſparent cornea, which then appears as if ſunk in; and the ſwelling and inflammation ſoon extend to the eyelids, and their motion is interrupted. At laſt the ſymptoms, little by little, abate of their violence, the ſwell-

ing of the eyelid diſperſes, and the eye opens: it then appears covered with a whitiſh matter, perfectly reſembling pus, which collects conſtantly at the inner angle, eſpecially during the night, which cauſes much difficulty in opening the eye in the morning: by degrees it acquires a purpliſh tinge, and at laſt returns to its natural colour and appearance.

In the height of the diſorder the patient often experiences violent pains, either extending all over the head, or only confined to the arch of the eyebrow. The pulſe is a little encreaſed in quickneſs, and the eye has always a great ſenſibility to light, and the rays of the ſun give a painful impreſſion: the faculty of ſeeing is encreaſed, as happens in the greater number of the pathologic affections of this organ that are connected with great irritation. Towards the decline of the diſeaſe, however, the patient ſees objects in a confuſed manner, as if through a miſt, and beſides, experiences many of the ſymptoms which attend an incipient amauroſis.

The duration of this ophthalmia varies from eight to thirty days, or even more, according to the concomitant ſymptoms, and the conſequences of the diſorder. Theſe are, for the moſt part, weakneſs,

weakneſs, and indiſtinctneſs of viſion, and ſometimes ſmall ulcers over the whole extent of the albuginea and cornea.

The moſt important object of enquiry on the ſubject of this diſeaſe, would be to find out a method of prevention; but it is almoſt impoſſible to ſeclude the body from the influence of thoſe external cauſes of diſorder which are conſtantly preſent; all that can be done, is to moderate their action in the moſt favourable manner. Whatever be the means propoſed for this object, they ſhould be expreſsly inſiſted on, and on that account, ſhould be ſo ſimple and eaſy of application, that the ſoldier may make them a part of his regular duty, which he will neither neglect nor omit. Among the beſt prophylactics, may be reckoned frequent waſhing of the eye with cold water, from which I have experienced the happieſt effects in a beginning ophthalmia; and on that account, I doubt not, that it would be be ſtill more efficacious as a preventative. This has, too, the capital advantage over other methods, in being applied with the utmoſt eaſe, and yields to none in virtue.

The diſorder which we are ſpeaking of very often cures itſelf by the ſpontaneous efforts of nature, and without having recourſe to art; and

one may ſay, with truth, that nothing ſo much ſtands in the way of a cure, as a multiplicity of remedies, eſpecially external applications. Some of our patients have been relieved by an eruption coming out upon the temples; and others, the greater number, by a ſlight diarrhœa; and it is conformably to theſe natural indications that I endeavour to keep the bowels open during the whole of the diſorder, by decoction of tamarinds, and other ſuch laxative ptiſans.

Our treatment has varied according to the different ſpecies of ophthalmia which we have diſtinguiſhed: I ſhall point it out in a few words. When the diſorder is merely local, and the inflammation not yet eſtabliſhed, we employ with ſucceſs the cold lotions which I have mentioned, and repellents of every kind. Bleeding from the arm would, in ſuch caſes, promiſe much advantage; but the decided bilious character of the greater part of theſe diſorders, have prevented us from having recourſe to this evacuation: beſides, it is ſtrongly counter-indicated in our ſoldiers, weakened as they have been by a long warfare.

Topical bleeding, which, however, we have not hitherto been able to adminiſter, would, probably, be as certain, and more favourable in its operation than general bleeding; at leaſt we have

have, in favour of this opinion, the example of the inhabitants of the country, who take blood from the corner of the eye with ſucceſs: this practice muſt, at leaſt, moderate the violence of the ſymptoms when the inflammation is at its height, and muſt, therefore, neceſſarily run through its regular ſtages. Hitherto we have confined ourſelves to removing from the eye every irritating cauſe, and eſpecially light. When the pain is very violent we apply a few emollients, but ſparingly, becauſe the relaxation which they occaſion would render the ſwelling very obſtinate, and much retard the cure. The application of a bliſter to the nape of the neck is, beſides, more ſerviceable in this caſe, eſpecially when the pain is not confined to the eye, but ſpreads over the greater part of the head. As ſoon as the violence of inflammation abates, we have recourſe to reſolvent collyria, which we gradually render ſtronger, and thus complete the cure.

When the ſymptoms indicate that the ophthalmia ariſes from a diſordered ſtomach, evacuants muſt immediately be reſorted to. I have already obſerved that the firſt emetic has often no other effect than to render this complaint more ſtrongly marked; it is therefore neceſſary to enſure ſucceſs to adminiſter a ſecond emetic:

often, too, we are obliged to evacuate the bowels, which I do by adding a few grains of jalap to the other purgatives. This mode of treatment muſt be continued daily in theſe ſtomach complaints attended with inflammation of another organ; they require the more active evacuants, except particularly counter-indicated. In the ophthalmia which we are now conſidering, the ſtomach affection is ſometimes, however, only a ſymptom which accompanies the idiopathic diſeaſe, and runs its courſe after the original diſorder is worn off: it requires the ſame plan of treatment as is mentioned above.

In the third ſpecies of ophthalmia which I have laid down, along with tonics employed internally, I join the uſe of external antiſpaſmodics: I have found none more powerful than bliſters, which therefore, in theſe caſes, form the principal remedy, whilſt in the truly inflammatory ophthalmia they are only indirectly uſeful. Their good effect is the moſt certain when applied behind the ears: this too is the place where the Egyptians apply the actual cautery, when they employ this remedy for ophthalmia of long ſtanding, and other inveterate diſorders of the eyes.

EXTRACT

EXTRACT OF A LETTER

From Adjutant-General JULIEN *to Citizen* GEOFFROY, *Member of the Inſtitute of Egypt.*

Roſetta, 20th Vendemaire, Year 7.

YOU aſk me, citizens, to ſend you more particulars concerning an obſervation which I have had occaſion to make relative to the method of making oaths in Egypt. It is but little that I have to add; but the leaſt particulars being intereſting to the impartial obſerver of the manners and cuſtoms of a people ſo remarkable, and ſo little known as the Egyptians are, it is with pleaſure that I tranſmit you any particulars.

When the Mamelukes appeared before us for the firſt time at Bahhmanyeh, our advanced guard ſtopped an inhabitant of the country who was croſſing the plain: the ſoldiers who detained him aſſerting that they ſaw him come from out of the enemy's ranks, looked upon him as a ſpy, and treated him rather roughly. On meeting with him, I ordered him to be conducted to head-quarters, but without do-

ing him any injury. The poor fellow, encouraged by what he ſaw of my manner of ſpeaking, endeavoured to convince me that he was not an adherent of the Mamelukes, and ſpoke with great vehemence, following up his words with very expreſſive geſtures; but as I had no interpreter, he ſaw that I could not comprehend what he ſaid. He then took up his blue ſhirt, and holding his *phallus* in his hand, he remained a few moments in that theatrical attitude, like a god ſwearing by Styx, and by his countenance he ſeemed to ſay, "After the terrible adjuration that I have made, dare you any longer doubt my innocence and veracity." His geſture called to my recollection, that in the time of Abraham the truth was ſworn to by taking in the hand the organs of generation.

This ancient cuſtom, preſerved ſtill among the modern Arabs, is not the only one: the more one ſtudies the manners of this half-ſavage people, the more light is thrown on the hiſtory of the Old Teſtament; and thus events, which have been regarded by ſome Europeans as ſupernatural, becauſe only extravagant, are eaſily explained, and one learns how to appreciate properly the merits of the heroes of the Moſaic hiſtory.

It may be alſo obſerved, that the example juſt men-

mentioned is not the only one in which the Egyptians depart from what we eſteem the rules of decency; they appear extremely ſevere with regard to the manners of their wives and daughters, and yet they care very little for diſcovering what we conceal with ſo much care. The moſt groſsly licentious ſongs, and the moſt diſguſting dances, are the amuſements which, in the privacy of their habitations, a grave muſſulman procures for his family.—Explain, who can, theſe whimſical contradictions.

DESCRIP-

DESCRIPTION

Of a new Species of Nymphæa,

Read at the Inſtitute by Citizen SAVIGNY, *on the 6th Vendemiaire, year 7.*

AMONG the aquatic plants whoſe bloſſoms, by their brilliance, their richneſs, and their varied colours, compoſe the moſt ſtriking ornaments of our brooks, our rivers, and lakes, there is a ſmall family with the following natural characters:—Their ſtature is generally low, their roots long, the leaves uſually radical, ſometimes floating on the ſurface, ſometimes entirely ſubmerged; the flowers are perfect, with a divided calyx, and many petals; the ſtamens inſerted in the piſtil; the ſeed-bud, generally inferior, terminated with ſtyles, or merely with ſtigmata. Theſe plants are ranged among the unilobate, becauſe their ſeed is a ſingle cotyledon, or if there are two, one is very ſmall, and ſcarcely perceptible.

Of all the genera which this family comprehends, there is none whoſe flowers exceed in ſize

and

and beauty thoſe of the genus nymphæa. The different ſpecies of which it is compoſed are readily known by their numerous petals and ſtamens, by their ſeſſile ſtigma forming a large radiated diſk, and ſituated immediately on the ſummit of the ſeed-bud, and laſtly, by their dry ſeed-veſſel, divided into many cells, each of which incloſes ſeveral ſeeds. Of this genus there are only two ſpecies in Europe, both of which are found in the neighbourhood of Paris; and probably no one has ever walked on the banks of the Seine, or in the low, marſhy meadows that border it, without admiring the large bloſſoms of the yellow water-lily, or thoſe ſtill more beautiful, and ſtill more ſplendid, of the white water-lilly. Egypt, as we ſhall ſee, has, in this reſpect, no reaſon to envy the countries of Europe.

In fact, from the time that the Nile begins to riſe and overflow, to that of its compleat retiring, the whole ſurface of the canals, the river, and almoſt all the inundated land, is enamelled with flowers, whoſe magnificent bloſſoms of white and blue charm the eye with their ſplendour, and fill the air with their agreeeable perfumes.

Theſe flowers belong to the two ſpecies of nymphæa, which are indigenous in Egypt. The firſt,

firſt, called by Linnæus, *nymphæa lotus*, has long been celebrated by hiſtorians and poets; all travellers, ancient and modern, have paid it the tribute of their praiſe and admiration. Savary, in his Letters on Egypt, often introduces it to embelliſh his pictures; it is alſo equally well known by ſyſtematic authors, moſt of whom have characteriſed it in a very ſatisfactory manner.

The ſame has not been the caſe with the ſecond ſpecies, namely, that with azure bloſſoms: few travellers ſeem even to have noticed it; and the deſcription of thoſe who have mentioned it is ſingularly vague and obſcure. Forſkal, who viſited Egypt in 1761, and who gave a very full flora of the country, does not ſeem to have obſerved it; and his ſilence in this reſpect is the more ſurpriſing, as the plant in queſtion always grows by the ſide of the nymphæa lotus, ſeeming to delight in mingling its bloſſoms with thoſe of its kindred ſpecies. It is not even mentioned in the laſt edition of the *Syſtema Naturæ*, publiſhed by Gmelin, notwithſtanding the care of this author in collecting all the ſpecies which are diſperſed through different publications.

It became therefore a *deſideratum* to give a name and ſpecific character to this nymphæa, as well

well as an exact deſcription, and thus to enrich botany with a new plant. To effect this is the object of the preſent memoir.

As, however, this ſpecies has many points of reſemblance with the nymphæa lotus, and ſince it is not impoſſible that they may have been often confounded, it will be better to deſcribe them comparatively, ſince thus the peculiar ſpecific characters of each will be rendered more obvious.

The root of the nymphæa lotus, and of the other ſpecies, which, from the colour of its corolla, I ſhall call *nymphæa cærulea* (blue water-lily), conſiſts of a bundle of long fleſhy white filaments, to the upper extremity of which are attached a number of round tubercles. In many of the provinces of Egypt theſe tubercles, eſpecially thoſe of the firſt ſpecies, are dug up and uſed for food; they are, however, dry, earthy, and unpalatable.

The leaves of each ſpecies are large, numerous, ſub-rotund, divided into two lobes from their baſe to the inſertion of the leaf-ſtalk, that is, to about the centre of the diſk. They are thinner than thoſe of the European water-lilies, of a deep green, ſhining on the upper ſurface, and often tinged with purple on the under one. The

leaf

leaf-ſtalks are radical, cylindrical, ſlightly compreſſed, and long enough to allow the leaf to float on the ſurface of the water.

The flowers are very large, often more than four inches in diameter; the peduncles ſpring from the root, and are each terminated by a ſingle flower.

The calyx is compoſed of eight leaflets, arranged in two circles, and coloured on the inſide; thoſe of the inner circle are the moſt coloured, and ſomewhat reſemble the petals. Theſe laſt, to the number of from twelve to twenty, are alſo diſpoſed in ſeveral ſeries. The ſtamens are yellow, with large petaliform filaments. The rays of the ſtigma vary in number from twelve to twenty-five; they are of the ſame colour as the ſtamens, compreſſed, and ſlightly inflected at the ſummit.

Such are the common characters of the roots, leaves, and flowers; the following are the chief ſpecific differences.

The leaves of the nymphæa lotus are ſurrounded with a ſharp, ſtiff, almoſt prickly ſerrature: their lobes are generally exactly parallel; their inferior ſurface is overſpread with prominent fibres; and the leaf-ſtalks are hiſpid.

Thoſe

Thoſe of the nymphæa cærulea, on the contrary, are ſcarcely waved at the edges, and their lobes are more pointed and divergent. The inferior ſurface preſents very few fibres, of which the largeſt alone are ſlightly prominent, the others being indented: the leaf-ſtalks alſo are perfectly ſmooth.

In the nymphæa lotus the flowers are always more expanded: the leaflets of the calyx are ovato-lanceolate, greeniſh on the outſide, without ſpots, but marked with ſeven pale very diſtinct ſtriæ.

In the nymphæa cærulea the leaflets of the calyx are narrower, lanceolate, almoſt wedge-ſhaped: their outer ſurface is of a deep green, variegated with dots and ſtriæ of a dark purple.

The petals of nymphæa lotus are ovato-lanceolate and very unequal, the interior ones being much ſmaller than the reſt; their colour is a pure milk-white, rarely ſtreaked with purple; and green on the outſide.

In the nymphæa cærulea the petals are all equal, lanceolate, of a brilliant white, tinged, eſpecially at the extremities, with the moſt beautiful azure, ſometimes ſlightly tending towards violet.

The

The ſtamens of the nymphæa lotus have very compreſſed lanceolate anthers, without any appendage to the ſummit, and ſcarcely of the length of the filaments.

The anthers of the nymphæa cærulea on the contrary are linear, but little compreſſed, and longer than the filaments; the ſummit is alſo terminated by a bluiſh awl-ſhaped appendage ſimilar to a ſmall petal.

Laſtly, the rays of the ſtigma are longer and more awl ſhaped in the nymphæa lotus; and ſhorter and ovato-lanceolate in the nymphæa cærulea.

The odour of each ſpecies is alſo different; that of the nymphæa cærulea being extremely mild and ſweet; whereas that of the nymphæa lotus is ſtrong, pungent, and much leſs agreeable.

The fruit offers no ſpecific differences, being in both a dry round capſule, covered with the baſes of the petals and leaves of the calyx, truncated and radiated at the ſummit, and divided into ſeveral cells, each of which correſponds to a ray of the ſtigma, and incloſes ſeveral ſmall round roſe-coloured ſeeds.

The Arabs well know the difference between the

the two species, having given a name to each: the first they call *neoufar*, and the latter *bachenyn*.

From the above description the following specific characters may be selected.

NYMPHÆA LATUS; *foliis dentatis, antheris apice simplicibus.*

NYMPHÆA CÆRULEA; *foliis repandis, antheris apice fibulato-petaloidis.*

REMARKS

On the Topography of Menouf, in the Delta.

By Citizen CARRIE, *Phyſician in Ordinary to the Army* *.

MENOUF, capital of the Menoufyeh, is ſituated on the ſide of a canal formerly navigable, but which has ceaſed to be ſo ſince the neceſſity of making a ſtrong dyke acroſs it at the diſtance of three leagues from the town, in order to reſtrain the water, which flowed into it in too great abundance, and thereby injured the irrigation of the lands on the branch of Damietta. This canal ſurrounds the walls of Menouf from ſouth to weſt.

Menouf is ill built, the houſes are very mean, the ſtreets narrow and crooked, as is the caſe in all Egypt: there are comparatively but few remains of antiquity.

Beyond the walls of the town, there is a circle of hillocks, compoſed of ruins and mounds of earth, which impede the view to ſuch a degree as to entirely obſtruct the view on the eaſt and weſt.

* Theſe remarks are extracted from the correſpondence of citizen Deſgenettes, principal phyſician to the army.

Near

Near the ſouth gate is a leaky canal, not more than two or three toiſes diſtant from that which has been juſt mentioned; the ſpace between them is taken up with the road into the plain. A little farther on is an elevation, on the top of which is a *ſanton* *, and at the bottom, cloſe to the great canal, is an old moſque. On the right of the gate to the eaſt are ſeveral pits for ſoaking flax, the vicinity of which is both diſagreeable and unhealthy. To the ſouth-eaſt is a burying ground, and on its right ſome more flax-pits. On the eaſt are other flax-pits, but in a ſtate of neglect and ruin, and full of ſtagnant water.

The north offers nothing remarkable; there is only a grove of palm trees by the ſide of a bad well; which from its poſition ſeems to have made part of a garden, the remaining trees of which were cut down for fuel before our arrival.

On the weſt, at ſome diſtance from the city, flows the canal of Menouf, and here alſo is a burial ground and the ruins of an old moſque, within the encloſure of which are a few ſcattered *ſantons*, ſurrounded with trees. To the ſouth-weſt, in another palm-grove, and alſo a few *ſantons*.

* A piece of wood on which the Turks ſuſpend utenſils for hanging their food, &c.

There are no gardens in Menouf and its vicinity, though all the circumjacent villages contain them, ſo that all the fruit and vegetables ſold here except dates and a few pot-herbs come from a diſtance. The principal crops in the neighbourhood are wheat, barley, maize, called here *dſourah*, beans, lentils, and lupins. The maize-harveſt which is the only one that I was preſent at, happens from ſeventy to eighty days after ſeed-time.

Water melons, cucumbers and melons are alſo raiſed, but in ſmall quantity.

The animals uſed in huſbandry are oxen, buffaloes, camels, horſes and aſſes: there are however but few horſes employed.

During the inundation, Menouf is ſurrounded with water, but it remains a very little while, except in pits and other low places. This is doubtleſs the reaſon of the healthineſs of the town, eſpecially on the north. It has alſo the advantage of ſhelter from the ſouth winds, while its open expoſure to the north and northweſt keeps it moderately cool.

The population does not exceed four or five thouſand inhabitants, though it is uſually eſtimated at double that number.

The prevalent diſeaſes are in general the ſame

as thoſe which afflict the reſt of Egypt. The plague, according to the report of the inhabitants, does not commit very great ravages here. The number of deaths laſt year did not exceed forty, and ſometimes it is even ſtill leſs.

The manners, cuſtoms, and mode of life in Menouf offers nothing remarkable, as far at leaſt as I was able to perceive. The common drink is the water of the Nile.

Thoſe men who are employed in cultivating the ground, are ſtrong but meagre; thoſe on the contrary who are engaged in ſedentary occupations, eſpecially the weavers, who form a numerous body, are fat. It happens very unfortunately that exceſſive corpulency is here eſteemed a beauty.

The children, till the age of five or ſix, are emaciated and feeble, with a pale or yellowiſh complexion, a ſwelled belly and general bloatedneſs, ariſing from an enlargement of the meſenteric glands. This is in part to be attributed to the indigeſtible food which their mothers give them while they are ſuckling and after they are weaned; the great mortality among the children, originating from this cauſe, would threaten the total extinction of the population, if it were not for the extreme fecundity of the women, from

which there results a balance, even with all these diſadvantages, in favour of life. Thoſe who could introduce and reduce to practice in this country a rational treatment of children, would render a great benefit to the human race.

I have no obſervations to make on the natural or moral conſtitution of the women, the cuſtom of the country not allowing any opportunities of obſervation.

AN

AN ARABIAN ODE

On the Conqueſt of Egypt. Tranſlated from the Original.*

By Citizen J. J. MARCEL.

THE ancient Arabs, ſays Sſefady†, derived their whole glory from three things, which they eſteemed above every thing elſe, military proweſs, the exerciſe of hoſpitality, and a talent for literature.

This peculiar eſteem for the cultivation of letters among the Arabs, was a conſequence of the conſtant advantage which they derived from poetry; it was this which ſerved them for hiſto-

* The author of this Ode is named *Nickoula el Tourk ebn Youcef Eſthanbouly*, he is a native of Beyrout, and appears to me to poſſeſs a far greater extent of information on literary ſubjects, than I have hitherto met with in any inhabitant of this country.

† El a'reb quadymân mâ kâna lehâ mâ ţefetkher bihi ĵllé êl-ſéïf oûé êl-dhéïf oûé êt-belâghet.

rical commentaries, by this they preserved the memory of family genealogies and of illustrious actions, and the martial feats of celebrated warriors were thus consecrated to fame in odes, *(el quassydeh)* and in poems, *(el phamaceh)* which were eagerly committed to memory, and transmitted from mouth to mouth, and from age to age.

Every year an assembly of Arabian poets met together at Mecca, which continued together a month. Their meetings were held in public in the midst of the union of all the Arabian tribes and people who annually resorted in numerous caravans of pilgrims to the sacred and opulent city of Mecca, which then enjoyed a celebrity equal to the ancient Delphos of the Greeks.

The poets there produced their best works, and the prize was decreed to him who was unanimously judged to bear the palm from his competitors. Happy was the orator in these contests; his name was inscribed on the columns of the temple*, and at his return his tribe decreed him the honour of a triumph.

Arabian literature was in its earliest age simple

* His work written in characters of gold upon silk, was hung from the walls of the *Ke'abeh* (the temple of Mecca).

and

and divested of ornament; the language partook of the rude manners of the savage state, and the people among whom it originated; but at the same time, in proportion as the Arabs were in a state more approaching to that of nature, their thoughts were stronger and more energetic, their style richer in ideas than words, and their expressions loaded with metaphors which often appeared exaggerated, because they were not familiar with those gradations and shades which cultivated nations have introduced in painting their ideas. The language afterwards became polished, and freed from its rudeness at the time when the conquering Arabs made themselves acquainted with Greek literature. By forming their style on the model of the excellent works in this language, and translating them in their own, they purified their taste and refined their native tongue.

However, even at this period the imitation of the Greek poetry by the Arabian authors was not servile: in receiving a spirit of order and regularity from the Greeks, the poetry of the Arabs has preserved its original tone, and that characteristic shade of difference which distinguishes it from that of every other nation. Its demeanour is entirely its own, it preserves its own manner

ner of thought, of expreſſion, of arrangement of ideas.

The love of poetry is ſtill alive among the Arabs: it has flouriſhed from generation to generation down from the earlieſt antiquity, and their hiſtorians in every period conſtantly mention a great number of poets who have flouriſhed in different ages.

Even at preſent, the Arab of the deſert, and the Yemen, entertain as high a reſpect for their poets, as for their warriors. Men repoſing in their tents from fatigue and the heat of the day, often one of them riſes, and like the northern bards begins to recite with enthuſiaſm the heroic deeds of ancient heroes, or the funeral eulogy of warriors ſlain in battle: immediately the ſurrounding audience ſhake off their drowſineſs, form a circle round the orator, whoſe words they ſay, "flow ſweeter than honey"—nothing can then diſtract their attention from the charm which captivates their ſouls, except the animating cry of war.

The following ode was compoſed ſoon after the conqueſt of Cairo; the pleaſure which it gave me, made me wiſh to tranſlate and publiſh it. Perhaps my friends will partake of theſe ſentiments,

timents, and if they discover in it some few sparks of genuine poetry, they will think the Arabian muse not unworthy of occupying a small place in that literary empire which has hitherto been exclusively devoted to Europeans.

Transcript

Transcript of the Arabian Ode, conformably to the Harmonic Alphabet of Citizen L——s.

AT length the dawn of happineſs breaks upon us; the time deſtined by God has arrived; an atmoſphere of felicity ſurrounds us; the reſplendent ſtar of victory which guides the French warriors has ſhed upon us its dazzling light; fame and renown go before them; fortune and honour accompany them.

The chief who marches at their head, is impetuous and terrible; his name terrifies kings; princes bow their haughty heads before the invincible Bonaparte, the lion of battles; his courage ſways irrevocable deſtiny, and the heavens of glory are proſtrate before him.

All muſt yield to his might! Woe to whoever lifts up againſt him the ſtandard of war! To declare enmity to him is to bring on inevitable ruin; he humbles before him the mighty who reſiſt him, but his generoſity to vanquiſhed nations is a ſea that knows no bounds.

Phœnix

Transcription de l'ode Arabe, Conformement à Alphabet Harmonique du Citoyen L—s.

LILLAHI a'ſſroun zahâ * félék èl-ſa'âdet ſyhi dâr
Oue djémâl kaoukéb déylét âl-*djéïch êl-Fran-çâouy lihâ ânâr
Yâ bhuſnhâ min déylétin * bêl-êftekhâr lihâ êchtéhâr.

Meqéddâmhâ dſou ſathouatin * téhday êl-mouloûk léhou él-ouéqâr.
Al-chehem Bounâpârtèh âçâd * êl ouéghâ dſou êl-îqtidâr
Men fâq qadrân oué êrtiqay * êvedje êl-cu'lâ oué ſamâa êl-fékhâr.

Mâvalay chédyd êl-batech * men a'âdahou hheull bihi êl-démâr
Mêlikoun téouéllay rétébân * khadh'at lihâ êl-el quom êl-koubâr
Mévalay a'mym néouâlihi * bahhroun tehezzch a'n quozâr.

Nedboun

Phœnix of his age! he has every where ſcattered terror by his more than mortal activity, and the aſtoniſhing ſwiftneſs of his conqueſts. Victorious over kings leagued againſt him, a new deſtiny awaits him, he prepares new triumphs. Immediately at his orders his unwearied legions throng to his ſtandard, at his commands the aſtoniſhed ſea is covered with a multitude of ſhips.

Alexandria, in ſpite of the obſtacles that oppoſe him, cannot withſtand his aſſault; Mohharrem * ſees him enter her gates victorious. Mohharrem! happy month, thou openeſt the year with glory, and addeſt to thy honours that of leading the French heroes to their career of triumph. Cairo ſoon beholds the conquering army, exulting in its new trophies, inundate her plains and ſcale her ramparts.

Every young warrior burns with impatience to ſignalize his valour. Bonaparte diſpoſes his warlike ſquadrons like an able general, and prepares for the attack: he diſplays the moſt conſummate ſkill in the art of war, the fruit of reflection and long experience.—Inſtantly at his orders his battalions ruſh forward with impetuoſity, and with a rapid courſe charge the preſumtuous Mamlukes.

* Mohharrem is the firſt month of the Heira.

Then

Ndboun téouahhadd bêl-ouaray * béohehâmétin dsât eu'itibâr

Qahara êl-mémâlek djemmétan * oué qadhay êlmorâd bémâ âchâr.

Oué âtay bédjéïchin ouâférin * oué mérâkébin théouat êl-bahhâr.

Oué témellek êl-êſkendéryeh * ſer'âtan doun êu'itiçâr

Bé Mohharremin chehroun bihi * hhaçan îſtitâhhin oué êntachâr

Oué mélâ êl-ârâdhy a'ſkérân * hhaoul êl-kinânéti oué istidâr.

Min koull ſſodâtin oué fétay * youm êl-qéttâl léhou îſsthibâr

Sſeff êl-ſſoufouf béhhikmétin * oué fénoun hharbin oué êkhtibâr

Oué ſethâ bécheddét a'zmehou * a'lay djyouch êl-ghouzz † ghâar.

† *Gouzz* is the generic name by which the Mamlukes are generally diſtinguiſhed in Egypt. The Arabians have taken the term from *Ghuz* or *Ghouje* the name of a Turkiſh (or

Then the battle glows like a fiery furnace, the din of arms ſpreads terror afar off, and congeals the ſoul with diſmay: the very infant who, in the midſt of common battles, knows not what it is to fear, now feels his hair briſtle and bleached with fright. Soon the beys tremble and are diſcomfited, they drink deep of the cup of bitterneſs, and their harraſſed ſouls fall a prey to deſpair at the event of this diſaſtrous day.

O ever memorable day! O God! preſerve us from being again ſpectators of ſo dreadful a battle. This innumerable multitude, armed by the beys for their defence, half cut to pieces, retire diſmayed into the deſerts. Death purſues their devoted heads, as if heaven, irritated by their crimes, had rained upon them its avenging flames.

In this general diſaſter each chief and each ſoldier has no other wiſh than to fly far from a land which their tyranny has rendered inhoſpitable to them; a black deſpair weighs down their ſunken ſpirits, and misfortune for ever becomes a companion to their ſteps. Bonaparte triumphs, and the defeat of the Mamelukes has decided their fate for ever.

Their

Oué âtçâr nâr êl-hharb fy * youmin techyb bihy êl-ſſoughar

Oué kéouay êl-ei'nâna'léihoum * oué ſaqâhoum kâs êl-mérâr

Oué ârâhoum youmân chédyd êl * hharb fyhi êl-a'ql-hhârr

Youmoun youqâl behhaqihi * lillah derrak min nihâr

Oué tébeddedét tilk âl * djémâhyr êl-a'dydet fy il qéfâr

Oué râou âl-ményét fouqhoum * qad êmtherêt djemrât nâr.

Oué él-béthech minhoum oué âl-fétay * thaleb êl-hanymèt oué êl-firâr

Oué êl-kerb hhall bihim oué hhâq * êl-ouyl fy tilk êl-dyâr

Oué l'itizz Bounâpârteh * oué êl-ghouzz ouéllét benkiçâr.

(or Tartar) nation, who are "intrepid, rapacious and cruel," according to Caſtell, *Lexicon Perſico-latinum*, page 403.

Their power is rooted out, and their princes, diſperſed and humiliated, have no other courſe to run than that of miſery and diſgrace. Cairo opens her gates and receives the victor in her boſom. The will of God is accompliſhed, and the ſecond month Sfafar * ſees the glorious completion of the triumphs which begun with the riſing year.

403. The Egyptians and Arabs have given this name to the Mamlukes, not ſo much to denote the country from which they originate, as they are bought while children from different countries, as to expreſs the contempt and hatred which they bear for them. In fact, the name of *Turk* or *Tartar*, which is ſynonimous, is the moſt cruel reproach that can be uttered by an Arab or Perſian. This is the reaſon why the ſubjects of the Grand Seignor, whom we generally call *Turks*, becauſe they originated from Turkeſtaw, a province of Tartary, reject the appellation with diſdain, and only acknowledge that of *O'tcmanlou*, or as we call it *Ottoman*, that is to ſay, ſubjects of Othman, the founder of this empire in about 1300. (L——s.)

* Sfafar is the ſecond month of the Muſſulman year. This year it correſponded with a part of Meſſidor and Thermidor.

Oué techtétét ômrâouhâ * oué ghadet bezullin oué îhhtiqâr

Oué foutouhh Meſſrin kâna fy * Sſafarin oué eûmr ûllah ſsâr

Oué beyoum ſebtin fyhi qad * ârkhet tamm âl-ênteſsâr.

M CC XIII*

* Without entering at large into the rules peculiar to Arabian poetry, I ſhall confine myſelf to two remarks which appear to be eſſential to our knowledge on this ſubject. Firſt; The verſe employed in this ode is compoſed of two hemiſtiches, each of which is called by the Arabs *miſſra'a* (houſe-porch) or *chathr* (wall), and the union of the two forms the whole verſe, called *beyt* (houſe). Theſe verſes are divided and ſeem in long and ſhort feet nearly the ſame as in Greek or Latin poetry, but they have this eſſential difference, that all the latter hemiſtiches are terminated by the ſame ryhme, which continues throughout the piece.

Secondly, The laſt words of the laſt verſe (which are undeclined) preſent a ſingular peculiarity; which is, that by their literal compoſition they give the date of the year of the Hegira, in which the conqueſt of Egypt was effected. The characters of the Arabic alphabet are often employed as numeral figures, and every letter of theſe two words has a numeral expreſſion, the union of which forms the whole number 1213.

The Greek and Latin authors preſent ſimilar examples of chronological verſes.

To underſtand this in a clearer manner I ſhall give ſeparately the letters of the two words tamm el-enteſſar with their numeral expreſſion *.

ta - - - - - -	400
mym - - - - -	40
alif - - - - - -	1
lam alif - - - -	41
noun - - - - -	50
ta - - - - - -	400
ſſad - - - - - -	90
alif - - - - - -	1
fa - - - - - -	200
	1213 †

* It may not be amiſs to add, that as to numeral value the Arabic letters follow the order of the Samaritan, Hebrew, and Syriac alphabets; which ſeems to me to eſtabliſh inconteſtably the prior antiquity of theſe alphabets, even over the ancient Arabic called *kouſic*, whence is derived the *neſkhy* (the modern Arabic), and which is itſelf derived from the ſtrangelo or ancient Syriac. (L—s.)

† The year 1213 began the 27th Prairial in the year 7 of the republic (Saturday, June 15, 1798, old ſtyle). The date of the events mentioned in this ode are too famous to make it neceſſary to lay them before the reader. (L—s.)

REPORT

REPORT

Of the Commiſſioners charged with the Examination of a Monument near the

GREAT AQUEDUCT OF CAIRO,

By Citizen DENON.

Read in the Sitting of the Inſtitute, on the 26th Vendemaire, Year 7.

THE Inſtitute, deſirous of aſcertaining whether the columns lying near the great aqueduct are the remains of an ancient edifice, nominated as commiſſioners for this purpoſe citizens Norry, Rigo, and myſelf.

We repaired to the place, accompanied by ſome labourers to remove the rubbiſh, ſo as to bring the whole of the ruins before our view.

Out of the whole number we found only four columns that were entire, four broken in two by their fall, one broken into three, and ſeven fragments of ſhafts of different diameters; the other parts of which could not be found.

We began by meaſuring the entire columns; of theſe the largeſt was eight metres ſeventy-nine

centimetres in lenth; one metre eight centimetres in diameter at the baſe; one metre in diameter at the top.

It was ill wrought, and chiſelled and poliſhed again in the defective places.

The length of the ſecond was ſeven metres twenty centimetres, and the diameter of its baſe was eighty ſix centimetres; it was the moſt beautiful of the whole number, well chiſelled and poliſhed.

I ſhall ſpare the Inſtitute the neceſſity of hearing dry details of meaſurement, which will only prove the accuracy of its commiſſioners, and which may be conſulted at pleaſure in the memoirs.

Theſe columns, from their vicinity to the minaret of a ruined moſque, appear to have formed part of the building; this cannot, however, be aſcertained on account of the ſaltpetre manufactory which is erected between the ruined colonade and the minaret; nor is the determination of this point a matter of the leaſt conſequence, it being evident, from the ſtyle of modern barbariſm that prevails throughout, that the building itſelf was raiſed, after the conqueſt of Egypt by the Mamelukes, out of ſome rich remains of antiquity united together into a diſcordant whole.

OBSER-

OBSERVATIONS

On the Colour of the Sea,

By Citizen COSTAZ.

THE colour of the ſea differs conſiderably when viewed from the ſhore, or from a ſhip at a diſtance from land; in the former caſe it ſeems green, in the latter blue, the tint of which is ſubject to ſeveral variations. From ſunriſe to noon the colour of the ſea varies gradually from indigo to ultra-marine, to Pruſſian blue, and at length to ſky blue, according to the decreaſed obliquity of the rays of the ſun: from noon to evening the ſame variations of ſhade take place, but in an inverſe order. Any part of the ſea that is in ſhade, however, even during mid-day, while the reſt is of a ſky blue, will preſerve its deep indigo tint. A cloudy day alſo produces the ſame effect. Hence it appears that indigo blue is the natural colour of the ſea, and all the other tints of blue are produced by the dilution of this with a greater or leſs proportion of the white light of the ſun. In the ſame manner the green colour of the ſea, when viewed from the

ſhore, is a mixture of its natural blue with the yellowiſh colour of the ſand at the bottom.

If it be objected that ſea water in a glaſs is perfectly colourleſs, I reply, that the colour is too dilute to be perceived, except in large maſſes; juſt in the ſame manner as common air, which is without the leaſt tint in a veſſel of colourleſs glaſs, yet is of a bright blue when viewed through the whole depth of the atmoſphere. Indeed, this appears to be the caſe with all other tranſparent bodies that ſeem to us void of colours, the tint being too dilute to become viſible, unleſs the bulk is very conſiderable.

PLAN

PLAN

Of a School for Deſign.

Read by Citizen DUTERTRE *at the Sitting of the Inſtitute, 6th Vendemaire, year 7.*

I SHALL not enter into any particulars of the the general utility of the art of deſign, perſuaded that you are all convinced of its importance as an eſſential part of a liberal education.

The application of this talent to our labours and reſearches will render our deſcriptions more ſtriking by the illuſtration of figures: by this means we ſhall preſerve thoſe monuments which time has impaired, and which barbariſm has disfigured or reſpected. We ſhall preſent to view the moſt intereſting or pictureſque ſituations; we ſhall repreſent with accuracy the utenſils of agriculture, and machines and inſtruments of all kinds; we ſhall convey correct ideas of the external conformations of plants and animals, as well as their internal organization; we ſhall copy the fineſt forms of the moſt beautiful varieties of the human figure; and ſhall not neglect to trace out the deformities conſequent of diſeaſe, for the benefit of thoſe who employ themſelves in the healing art.

I propoſe

I propoſe, therefore, to eſtabliſh in the Inſtitute a School of Deſign, under the following regulations:—

1ſt. That there ſhall be models made of the human figure for the uſe of beginners, in order to prepare them for the ſtudy of the living ſubject.

2nd. That the ſchool where theſe ſhall be depoſited be open every day for the uſe of the ſcholars.

3d. That the ſcholars ſhall have liberty to copy from a living model every day, from ſix in the evening to eight, during a decade.

4th. That there ſhall be no profeſſor by name: all the artiſts being invited to ſupply inſtruction to thoſe who may frequent the ſchool.

5th. That ſuch members of the Inſtitute as are converſant in anatomy, ſhall be invited to give ſome demonſtrations, with a view to aſſiſt the artiſt.

6th. That this plan ſhall be ſubmitted to the examination of a committee, who ſhall aſcertain the expence conſequent on the eſtabliſhment.

PLAN

PLAN

Of an Agricultural Eſtabliſhment in Egypt.

By Citizen NECTOUX.

Read before the Inſtitute, 16th Vendemaire, year 7.

THE principal attention of an enlightened government ought ever to be turned towards agriculture: it excites induſtry, animates commerce, and becomes an inexhauſtible ſource of glory and happineſs to nations.

The importance of an agricultural eſtabliſhment is ſo generally acknowledged, that we cannot delay the creation of one in a country, the phyſical organization of which confers on all kinds of productions the ſite, expoſition, and degree of temperature proper for each. In ſhort, Egypt gives the government juſt grounds for hoping that we ſhall be able to cultivate, with ſucceſs, all the plants of acknowledged utility, whether indigenous or exotic.

The conformity of the climate with that of South America, during a large portion of the year, promiſes new ſources of riches in the ſugar-cane, indigo, and cotton; perhaps the coffee tree,

tree, and a number of other productions, no leſs intereſting, may be alſo introduced. Among theſe ought to be diſtinguiſhed, in a particular manner, the culture of cochineal, being of infinite conſequence, at leaſt ſo far as wealth is concerned. It is alſo attended with this advantage, that it requires but a ſlight preparation in order to render it marketable: it beſides accommodates itſelf to lands of a middling quality; and thoſe where but little rain falls are the moſt favourable.

The ſugar-cane, indigo, and cotton, are, in fact, already reared in this country, but with ſo ſmall a portion of ſucceſs, or, more properly ſpeaking, with ſo little ſkill and encouragement, that they may be fairly conſidered as a new branch.

But the direction of theſe eſtabliſhments can be confided to thoſe men alone, who, to a knowledge of warm climates, unite the practice and theory of colonial agriculture, and have, in ſome meaſure, guaranteed their ſucceſs by a long ſeries of voyages and experiments.

The great number of unſucceſsful eſſays of this kind, more eſpecially in our windward and leeward iſlands in the Weſt Indies, ought to be attributed:

1°. To

1°. To an improper choice of poſition;

And 2°. To inexperience in reſpect to that ſpecies of culture, which, by appertaining to hot countries, is entirely different from the mode followed in Europe; for it is not in this caſe intended to attempt the productions of France, or the northern nations, but preciſely thoſe in which they are deficient, which they are, in fact, incapable of attaining, but which have become abſolutely neceſſary to the inhabitants.

To avoid all error, in reſpect to an appropriate ſite, it is neceſſary to wait until the country can be traverſed in ſecurity, and its internal organization examined, ſo that every commodity may be reared in the place moſt analogous to its nature. The enormous loſſes attendant on bad ſucceſs, will be thus prevented; but even then, eſtabliſhments of this kind, ought only to be confided to men capable of adminiſtering to the new plantations that care which is ſo requiſite at the commencement, either to accelerate their produce, or to multiply it by all the modes which it is in the power of art to employ.

By adopting ſuch precautions as theſe, it would not only be eaſy to diſtribute a ſufficient quantity of the different ſpecies of productions meant to be introduced among the inhabitants, but alſo

to

to form pupils capable of turning to advantage the treaſure committed to their charge. It is thus, that, ſtimulating them by means of their proper intereſts, they might be ſnatched at the ſame time both from apathy and ignorance, under the yoke of which, deſpotiſm hath hitherto kept them bent.

At the aſpect of theſe improvements, the Egyptian would behold the golden cane, whence the ſugar is extracted, ſpring out of one part of his native country; in another, they would contemplate the coffee tree loaded with its red and precious berries; here they would ſee the young ſhoot of the indigo ſhrub; there the ſilky cotton, ſo admirably adapted for garments; in ſhort, a multitude of other productions equally intereſting.

The culture of theſe would inſtantly engage their attention; and the hope of immenſe advantages would determine them to prefer ſuch gains as are a little tardy, but much more conſiderable, to thoſe which offer but a middling harveſt.

The botanical cultivator would here unite the uſeful with the agreeable, and with the aſſiſtance of thoſe labours, which would ſoon become familiar, he would be enabled to heap up treaſures for commerce, dying, and the other arts.

The hoſpitals would derive daily aſſiſtance from the plants of the country, which would be collected in gardens conſecrated to that purpoſe; and we ſhould have a new opportunity of determining whether each climate produces ſimples adapted to the cure of the maladies which prevail there.

There is no perſon who has not remarked in the courſe of his travels, that the peaſantry are every where acquainted with a number of remedies extracted from vegetables; and it is only to be lamented that their knowledge is uſually confined to their own habitations.

The ſole mode of uniting all the advantages which I have juſt pointed out, would be to inſpect the country, and, after collection, to place all the plants in a national garden, where every inhabitant might obtain a complete knowledge of them. In reſpect to ſuch as would require ſome experiments for perfecting the dyer's art, theſe might be cultivated on a great ſcale; and it is notorious that this country preſents amazing reſources, ſo far as the lucrative trade of drugs and dye ſtuffs are concerned.

It is in national eſtabliſhments that grand experiments ſhould be made; it is there that thoſe precious commodities ought firſt to be brought

to

to perfection, which formerly acquired for St. Domingo the appellation of *the French gold-mines.*

They are alſo to be found on the ſurface of the Egyptian lands. This territory preſents a ſingular ſoil, in which the productions of all the four quarters of the world may be reared. There is not a ſingle ſpot on the whole globe that preſents equal advantages in reſpect to poſition.

In order to render ſuch an eſtabliſhment advantageous, it ought to be placed in a ſituation that has been ſelected with great diſcernment; it is neceſſary that the climate ſhould be temperate, that is to ſay, placed as nearly between fifteen and twenty-four degrees as poſſible; the ſoil ſhould be deep, of a good quality, ſheltered from the prevailing winds, by either natural or artificial means, and refreſhed with a current of water, or by means of hydraulic machines.

After having made choice of a proper ſpot, it ought to be advantageouſly laid out, and the neceſſary labours in reſpect to cultivation commenced; nothing ſhould be neglected, not even botanical excurſions, for the purpoſe of multiplying the different ſpecies; but I once more repeat it, that until a perfect knowledge of the country

country has been once obtained, nothing of this kind ſhould be attempted.

It alſo appears to me highly proper, while forming eſtabliſhments, whence are to iſſue the knowledge neceſſary for the perfection of a new ſpecies of agriculture, to make choice of a place large enough for the purpoſe of alſo erecting manufactories, for the various productions about to be reared. It is there, that the eye of an inſpector, continually employed in obſervation, would be enabled to utilize and ſimplify the proceſs of each, in order that he might communicate them in ſucceſſion, by means of memoirs addreſſed to the cultivators.

It is requiſite for the ſucceſs of ſuch an enterprize, that men acquainted with the nature of the different productions, ſuch as the ſugar-cane, indigo, coffee, and cotton, ſhould be collected; they might be choſen from among the ancient coloniſts at preſent reſiding in France. It might not be difficult perhaps, to train up proper perſons for the cultivation of the two laſt; but it is indiſpenſibly neceſſary to ſelect experienced men for the two firſt.

I deem it proper to remove eſtabliſhments ſuch as theſe, to a conſiderable diſtance from the ſea ſhores, as they are expoſed to impetuous

winds, as well as to a ſaline atmoſphere; ſimilar care ought to be taken, to avoid the neighbourhood of the ſands of the deſert. A ſpot might be found at a ſmall diſtance from the banks of the Nile, which would add to many other advantages, that of not expoſing ſuch plants as are imported and exported, to the inconveniencies attendant on land carriage; theſe frequently occaſion their loſs.

One of the gardens ought to become a kind of receptacle for all the vegetable productions cultivated in the others: there alſo might be prepared thoſe collections of living plants and ſeeds, deſtined for the muſeum of natural hiſtory. I am content with tracing a mere outline; we muſt at preſent confine ourſelves to general obſervations alone, having as yet examined Egypt only in a rapid and ſuperficial manner: it appears to me, therefore, to be the ſageſt mode, to leave the minutia of every kind to another time, when they can be diſcuſſed in particular memoirs.

EXTRACT

EXTRACT

Of Observations by Citizen CERESOLE, *Physician in Ordinary to the Army, during a Journey along the Western Banks of the Nile, from Cairo to Siout.*

Head Quarters at Cairo, 30th Vendemaire,
7th Year of the French Republic.

THE complexion of the inhabitant of Sayd, (Sfa'id) is of a browniſh hue, the features of the face are ſtrongly marked, the eyes are black, ſmall, deep in their ſockets, the pupil contracted, the aſpect fierce; the muſcles which are prominent, project conſiderably at the extremities. The features of the women are more ſoft, and the center of the whole perſon more obtuſe; but they do not poſſeſs either the luſtre of beauty, or the grace of the European; an oblongated and flabby breaſt, added to a prominent belly, at an early period of life, mar the advantages reſulting from their height; their eyes, however, muſt be allowed to be expreſſive, and their teeth are extremely white. In proportion as one advances towards

Siout (Syouth), he diſcovers in the form of the noſe, the lips, the traces of connexion with the natives of the internal parts of Africa.

The temperaments of the inhabitants differ according to age and ſex; the children are in general diſpoſed to phlegm, and conſequently weak, while the adults, more eſpecially the men, are ſanguine and robuſt. The intellectual faculties correſpond with the ſuppleneſs and activity of their organs. Theſe are evidently modified, as well as the phyſical ſtrength, by their more or leſs indolent mode of life, their habits, the neighbourhood of, or diſtance from the Nile, the air which they breathe in conſequence of being ſhut up along with the cattle, in their ſtables, or accuſtomed to wander in full liberty throughout the country.

Here is to be found a ſobriety, even in the boſom of abundance; the people in eaſy circumſtances have good bread, fleſh, fiſh, eggs, and garden ſtuff on their tables: the poor eat broths compoſed of the meal of Indian corn, or of legumes. The term of life is pretty much the ſame among both claſſes, notwithſtanding the difference of their manner of living: the men begin to loſe their ſtrength at about fifty years of age, and are very old at ſixty; allowing for a few exceptions,

the

the women in this part of the country, as elſewhere, fall ſooner into decrepitude.

Menſtruation and fecundity commence at from ten to twelve years of age, and terminate at from thirty-five to forty and forty-five. The boys when twelve or fourteen years old, begin to experience certain deſires; they even excite theſe by means of ſtimulants, and in the complaiſance of the other ſex, eaſily find the means of ſatisfying their cravings. It is perhaps on this account, that a certain vice which makes ſo many ravages among us, is but little known among them.

The water of the Nile, either clarified or filtrated, is their uſual beverage; but the Egyptians do not always drink when they feel an inclination; they prefer taking mouth fulls of the liquid, without ſwallowing it, and pretend that this element, ſo uſeful when uſed in moderation, becomes hurtful when drunk to exceſs; that it produces too great an abundance of ſweat or of urine; opens the belly; and enfeebles the whole ſyſtem. They delight in ſherbets, liquorice water, pills made of hemp ſeed, and ſome articles of confectionary not equally reliſhed by us.

The children of both ſexes are commonly naked, from ten to twelve years of age, in the country adjacent to Minyeh, and Siout (Syouth);

and it is eaſy to be perceived, that the organs are then fully developed. A ſlight dreſs of wool or cotton afterwards cover their dark and hardened ſkin; in other reſpects they preſerve the faſhions of Lower Egypt, in their veſtments and turbans.

The men live on the ſame floor along with the domeſtic animals, and ſleep ſometimes on mats, with their clothes upon them.

The firſt and only ſtory, or, by way of expreſſing myſelf more clearly, the whole of the upper part of their habitations, is conſecrated to pigeons and turtle doves, which abound in the Sayd (Sſa"id).

In the towns there are ſome well built houſes; rich people poſſeſs their hharems, and enjoy the other luxuries of life; the markets abound with ſhops, which are dark and narrow. On caſting an eye on the inſtruments and labours of the artizans, they are diſcovered to be rude and imperfect, although they themſelves are far from being deſtitute of addreſs.

The children, whoſe parents are in pretty eaſy circumſtances, learn to read; the Copht merchants *(Quobthes)* are acquainted with the firſt rules of arithmetic; and to theſe limited attainments may be attributed all their influence.

There are beggars, who run about the ſtreets accom-

accompanied by muſicians; and alſo many Santons, for whom the people are inſpired with great veneration.

The peaſants, far more reſpectable, and infinitely more uſeful than the contemplative myſtics, ſow, till, and refreſh the ſandy plains with the waters of the Nile. The vegetation, which is at once rapid and delightful, has a great analogy to the animals which it ſuſtains.

The vices of poliſhed nations are prevalent throughout the Sayd (Sſa'id), and they are carried to ſuch a pitch, as to produce thoſe evils ever attendant on ignorance and ſlavery.

At the gates of Siout (Syouth) there are a number of diſorderly women, who ſtop the paſſengers; and they are acquainted in that place with the ſhameful ſpecies of proſtitution, which counteracts the end of nature, and her admirable laws for the reproduction of beings.

Notwithſtanding their reſignation to deſtiny, which makes them conſider maladies as an inevitable chaſtiſement, the old men, and particularly the old women, diſtribute amulets and taliſmans for all ills, but more eſpecially as a preventive againſt magic and magicians, who, according to their way of thinking, occaſion all the evils incident to the univerſe.

The knowledge of medicine, if we may confer that name on a rude and ridiculous empiricism, consists in a series of loose observations, entirely unconnected with each other. The sick are exposed in the streets, or at the doors of the mosques; it is there, more especially, that they exhibit the disgustful and afflicting spectacle of such diseases as attack the absorbent system of the skin, and constitute that numerous class on which nosologists have conferred the appellation of cachexy. Whether the maladies be old and inveterate, or violent and recent, they manifest nearly the same indifference in respect to their termination.

Notwithstanding this, the inhabitants of the Sayd (Sa'id) are inspired with great confidence in regard to foreign physicians, and they readily communicate their situation to them. They accordingly have learned to give decoctions of herbs to their children, on purpose to destroy worms; and a drink, composed of linseed oil, for the purpose of calming convulsions; they have found out also that the nurses (and this is an interesting fact) often drink the medicaments destined for their infants; that consumptions frequently succeed obstructions of the belly; and that the small-

ſmall-pox is dangerous, often producing weakneſs in the eyes, and ſometimes blindneſs.

Their treatment of this laſt malady is directly oppoſite to what experience teaches us to conſider ſalutary: the ſick are ſhut up in cloſe apartments, carefully wrapped up, and ſubject to a hot regimen. May the inhabitants of theſe countries learn, ſome day, to adopt the more natural method which hath ſo much ſoftened that once-redoubtable ſcourge throughout Europe!

The children are ſeldom diſtorted: this circumſtance, perhaps, proceeds from the liberty they experience, as their limbs are never compreſſed by any kind of bandages whatever.

At Minyeh I was conſulted about a girl of fifteen years of age, who was afflicted with the chloroſis. Her mother, and ſome other old women, had endeavoured in vain to reſtore her, by means of mechanical irritation, a few drugs and many amulets. I adviſed the uſe of chalybeate; but the repugnance teſtified by them, in reſpect to ſuch medicines as proceed from the mineral kingdom, prevented the family from recurring to this mode of cure.

An old empiric of Siout (Syouth) accompanied me almoſt conſtantly, with a view of aſſiſting in my enquiries. He had but one eye, was a great

a great boaſter, and was accuſtomed to vaunt that he poſſeſſed marvellous ſecrets, by means of which he could cure all kinds of maladies. Theſe he pretended to have either extracted from the Koran, where aſſuredly they are not to be found; or to have become acquainted with, in conſequence of the inſpirations of the Prophet, with whom his connection was equally problematical.

Child-bearing is here accompanied with an inclination to vomit, and other deſires, ſome of which are very fantaſtical. The women frequently miſcarry in ſummer. They ſuffer more at the birth of their laſt than their firſt child, and would rather die than allow themſelves to be aſſiſted by a man-midwife.

If young women are not with child within a little time after their marriage, they ſolicit the aſſiſtance of the more aged, who anoint ſuch of the internal parts of the ſexual organs as can be eaſily reached, with liniments; they alſo give them powders, the nature of which we are no more acquainted with than the virtues of thoſe enchantments which they uſe at the ſame time! Sterility is branded with infamy by the law of Mahomet!

In hyſterical affections to which the females are ſubject, they either make them ſmell the dung

dung of the camel, or apply it in form of a cataplasm, along with sour milk, to the temples, the stomach, and the lower part of the belly. The women are frequently subject to diseases of the vagina and the rectum.

During internal maladies, the inhabitants of Sayd (Sa'id), generally give themselves up to repose and a vegetable diet, which they scrupulously observe. They are acquainted with the purgative faculty of aloes, cassia, and tamarinds; but they do not know when to administer these medicaments with propriety. Some of them eat slices of quince powdered with pepper, to stop a diarrhœa; others drink lemon-juice. Cachexy is reputed incurable. Cancers are covered with powdered chalk; they also apply animals just killed and opened, to the head, the side, and other parts of the body, in recent pains: frictions, as also hot and cold baths, are in great vogue.

In maladies of the eyes, the head is frequently shaved, and afterwards rubbed with vinegar; some colour the eye-lashes, and apply a black plaister to the eye-lids. They also scarify the angles of the eyes, and throw certain powders on that delicate organ itself; but water, either by itself, or when employed as the vehicle of any medi-

medicament, is rejected; all liquid topical applications are considered to be dangerous.

They often practise bleeding with a fleam, similar to that employed by our farriers: they adapt, to the surface of the skin, the base of a cone formed by the horn of a young bull, which has been pierced at the top. By means of suction, they attain the same effect as that produced by a cupping-glass, and are thus enabled more easily to scarify the parts.

Milk and honey are employed in diseases of the breast; tobacco and coffee are considered as aperients, which facilitate digestion.

I have seen a great number of hernias, of all manner of forms and sizes, without any pains whatever being taken either to confine or support them. At Siout (Syouth), I administered a vomit to a young man; during the operation, all his family were greatly alarmed; he was indeed believed to be poisoned, but the ease that ensued at-length reconciled them to this remedy. When a wound has been occasioned by fire-arms, oil or melted butter is applied; they afterwards use some portions of flesh belonging to an animal newly killed, which they carefully renew; they then cover the whole with the skin of the same, and leave the patient to nature and repose.

They

They endeavour to reduce diſlocations, by employing very violent diſtention. They abandon venereal maladies, leproſy, and the elephantiaſis, to themſelves.

I was unable to attain ſo much information relative to the plague as I could have wiſhed. I am induced to conclude, however, after much enquiry, that the term *plague*, or *koubeh*, in Arabic, is a generical denomination applied to all very violent and malignant diſeaſes. They aſſert in the Sayd (Sſa'id), that this malady has been always brought thither from Lower Egypt.

The reſignation of the muſſulmen to their deſtiny, prevents them from guarding againſt that horrible ſcourge. The dogmas of the ancient Egyptians, who conſidered life merely as a paſſage to a long, future exiſtence, a ſleep that leads to an eternal waking, ſeem to be alſo preſerved among their deſcendants; and one is almoſt convinced of the truth of it, when on comparing the houſes and the tombs together, he always beholds the dead better lodged than the living.

AN

AN ATTEMPT

To tranſlate a Fragment of the Koran into Verſe,

By Citizen MARCEL.

THE Quoran, Koram, or *Eminent Book,* is conſidered by the Muſſulmen as a maſterpiece of eloquence: the Arabs indeed pretend, that there is not a better written production in their whole language; and it is certain that the ſon of Abdallah was leſs indebted to the ſwords of his partiſans for the greater part of his aſtoniſhing ſucceſs, than to the hundred and fourteen *ſourat*, or chapters, which he cauſed to deſcend in ſucceſſion from heaven, on purpoſe, as occaſion ſerved, to electrify the rude minds of his countrymen.

The Koran, like the Bible and the Vedas, contains the principles of a pure morality, intermixed with a variety of ridiculous fictions, which philoſophy would not be able to contemplate without pity, did ſhe not conſider at the ſame time, that it was preciſely this very combination of truths and reveries that enſured the triumphs of the *Apoſtle of God,* whoſe policy, enlightened by the

the ſtudy of the human heart, and the knowledge of the character of his contemporaries, eaſily perceived that it was neceſſary to employ the obſcure and unintelligible language of prophecy to thoſe who were deaf to his voice, when preaching truths far too ſimple for them, he exclaimed*: "Adore the Supreme Architect of the Univerſe alone! This God is one, indiviſible, without equal, without aſſociate; he neither engenders, nor is engendered; men of all religions are acceptable in his eyes, provided they be juſt and benevolent."

The ſtile of the Koran is different, according to the different objects of which it treats. When the happineſs deſtined for the faithful is to be depicted, it exhibits a richneſs of imagery, and a magnificence of expreſſion that dazzles by its variety; and when it addreſſes himſelf to the enemies of *Iſlamiſm*, it reſembles a fire that ſcorches, or thunder, that lays every obſtacle in the duſt.

* Sourat 2, 64, and 112. *Nota.* This word ſignifies the ſteps of a ſtair, &c. The chapters of the Koran are the ſteps by which one aſcends to the work itſelf. The verſes are called *kyat*, marvel, or miracle. Each verſe of the Koran appears to a Muſſulman to be a miraculous production of divine power. (L—s.)

In

In addition to this, he takes advantage of the genius of his language; his phraſeology may, perhaps, ſeem to us to be ſomewhat diſtorted, and wholly deſtitute of tranſitions: it is alſo replete with metaphors which we are apt to conſider as unreſtrained and hyperbolical, but which appear to the Arabs to be grand and lofty.

But he is truly ſublime when he ſpeaks of the Divinity, and invokes or addreſſes prayers to him, which are always expreſſed in a dignified manner, wholly deſtitute of myſtical affectation.

As an example of this, may be cited the firſt *Sourat*, called *Sourat el-fatihhat*, or introductory chapter, for which the Muſſulmen entertain ſo ſingular an eſteem, that they repeat it ſeveral times a day.

I regret that I am not able to tranſuſe into a tranſlation thoſe beauties that ſparkle in the original; beauties ſo manifeſt, that when the celebrated *Lebëïd* happened to read at a gate of the moſque where a number of the Arabian poet, had aſſembled, ſome fragments of the Koran which Mahomet (Mohhammed) had cauſed to be attached to it, he inſtantly withdrew the poem he himſelf had carried thither, declaring that no writer ought to attempt to rival the author of the paſſages he had then peruſed.

TRANSLATION.

TRANSLATION.

In the name of the Being, ſupreme in power as in eſſence; in the name of a gracious Deity; a God replete with benevolence, who every day loads us with his gifts; toward whom we elevate our eyes, and offer up incenſe!

All praiſe be aſcribed to the God of heaven, of earth, and of the ocean; the Father of the univerſe!—Ruler of worlds!—Arbiter of the deſtinies of mankind at the day of judgment!—Avenger of the oppreſſed—Supporter of the innocent!

It is towards thee that our hearts offer up their prayers; it is thee whom we implore as a common father! hearken to thy children! may equity always follow their ſteps, and be their aſſured guide! O may they fly from the deluſive paths of error! may no crime on their part call down thy wrath! and directing conſtantly towards thee their hearts and minds; may they always prove themſelves thy real adorers!

TRANSCRIPTION AND TRANSLATION

Of the firſt Sourate of the Koran,

By Citizen L——s.

Soûrat fâtihhat âl-kétâb êl-a'zyz, oûé hye seb'a âyât, Mekkyet.

BISM illahi er-rahhmani er-rahhymi

El-hhamdou lillahi rabbi el a'alemyne.
Er-rahhmani er-rahhymi.
Maleki yeoumi ed-dyni.
Eyyaka na'bodou oue eyyaka neſte inou
Ehdena el-ssiratha el mouſteqyme
Sſiratha el-ledſyne an'amte a'leihim.
Ghairoul-magdoubi a'leihim oue la edh-dhalyne.

TRANSLATION.

The Sourate which begins the auguſt book, contains ſeven verſes, and was written at Mecca.

In the name ~~of God~~, benign and merciful!

All praiſe be to God, the governor of worlds; merciful and benign; ſovereign director of the day of judgment.

We

We adore thee, and implore thy ſuccour!—Direct us in the ſtraight path; in the way of thoſe who experience thy benefits; who have never provoked thy wrath; and never wandered from thy worſhip!

According to the commentaries on the margin of the edition of the Koran, publiſhed entirely in Arabic, at St. Peterſburgh, in 1789, in one volume, folio, for ſuch of the Muſſulmen as are ſubjects of Ruſſia, "the theologians (eu'lema) are not agreed as to the place where this *Sourate* deſcended from heaven: Some of them maintain that it was at Mecca; others, at Medina. The following are two of the names given to it; *the mother of the Koran and the ſeven repetitions*, becauſe it contains ſeven verſes, which the Muſſulmen have continually in their mouths." The author of the commentary juſt quoted by me, remarks "that this Sourate contains 20 words, and 123 letters." It is well known that the Muſſulmen have had the patience to perform the ſame taſk for the whole Koran. See *Reland, De Relig. Moham.* p. 25. (L——s).

On the Dying of Cotton and Flax, by Means of the Carthamus.

THE Carthamus is the flower of a plant ſcarcely ever cultivated any where except in Egypt; but which is an important object in the commerce of that country. It is employed in Europe for dying ſilks of a poppy, a cherry, and an orange colour: the rouge which confers on women the colour of the roſe, is compoſed of the tint of the carthamus, mingled with talc powdered very fine.

The dyers in Europe but ſeldom make uſe of it for cotton, not being able to obtain a ſufficiently rich colour by that means: perceiving, however, that it is here employed with ſucceſs, by thoſe of the ſame profeſſion, I repaired to one of their ſhops, in company with the citizens Deſcotils and Champy, jun. and cauſed a piece of muſlin and another of linen to be dyed in our preſence.

The dyer made uſe of well-water, that is to ſay, of water containing a little alkali, to cleanſe the carthamus from the yellow ſubſtance which it is firſt neceſſary to ſeparate from that which is the

the red colouring matter; after macerating and leaving it for twenty-four hours, he expreſſed the carthamus, and transferred it to a ſecond water, where it remained during twenty-four hours more, when the ſame operation was repeated.

In this ſtate the carthamus was mixed with a fifth of its own weight of certain aſhes, which contain but a ſmall portion of ſoda, and then placed beneath the ſtone of a common mill. After ſeveral turns of the mill-ſtone, it was collected with a view of being employed. The dyer then cauſed a ſmall quantity of the water of the Nile to be applied, ſo that the liquid thus filtered through it became tinted with the colouring ſubſtance; this being done, he ſeparated the laſt portion filtered, and employed it the firſt, mixing a little citron juice with it at the ſame time. The cotton being now impregnated with a faint colour, the firſt liquid was mingled with a conſiderable quantity of citron juice, in a caldron placed over a furnace, and the dying was completed in a warm bath of between forty and fifty degrees: the cotton ſoon after aſſumed a highly ſaturated and beautiful colour. On leaving the copper, it was paſſed through water acidulated by means of citron juice, and finally dried.

The linen was treated in the ſame manner; it was, indeed, leſs ſaturated with the colour, but the tint was ſtill beautiful.

The difference between this proceſs and that practiſed in Europe, conſiſts in this:

1°. That water, in a ſmall degree alkaline, is made uſe of, on purpoſe to extract the yellow colour.

2°. That the alkaline is incorporated with the carthamus by means of a mill-ſtone, inſtead of a ſimple admixture, which probably cauſes it to yield a greater quantity of the colour when diſſolved in water. And

3°. That the bath is here a little heated, while this operation is performed in Europe with cold water.

The cotton dyed by means of the carthamus, does not ſtand the application of ſoap, becauſe its colouring matter is ſoluble in alkalies; in that caſe it aſſumes a violet tint: it however will endure a ſlight application of ſoap, provided it be thrown immediately after into water acidulated by the juice of citron; it will not, even then, it is true, re-aſſume its original colour, but preſent an agreeable lilac ſhade.

The luſtre of the carthamus does not long endure the action of the ſun, yet it becomes weaker without changing its hue; and all its former

vigour

vigour may be reſtored by means of a ſecond dying. But, in order to ſucceed in that operation, it will be neceſſary to begin by putting the ſtuff in a bath compoſed of an alkaline water of carthamus, and not add the citron juice, until it has been impregnated with the colouring ſubſtance.

MEMOIR

Relative to the Lake Menzaleh, in conſequence of the Knowledge obtained, in Vendemaire, 7th Year.

By ANDREOSSY, *General of Artillery.*

EGYPT has been the cradle of the arts and ſciences. Their principles were either collected by the colleges of prieſts, or confided to thoſe hieroglyphics, the language of which is no longer known. The Egyptian prieſts, occupied in an eſpecial manner with obſerving the heavenly bodies, paid but little attention to the natural facts that occurred before their own eyes: thus when Herodotus was at Memphis, he perceived, while converſing with the prieſts, that they were unacquainted with the cauſes of thoſe changes that had occurred in the lower parts of their country, comprehending that ſpace between the entrance of the plain and the ſea.

It is a remarkable circumſtance, that at the epoch when this father of hiſtory travelled through Egypt, it had but juſt emerged from a long war, during which every thing appertaining to public economy was neglected; the canals had

had consequently experienced its disastrous effects. In addition to this, the inhabitants still groaned beneath a military government similar to that of the Mamelukes, and the lands in the neighbourhood of the desert were then, as now, infested by robbers.

Herodotus accordingly found Egypt in nearly the same state as it has been ever since, and consequently was not able either to ascertain or collect a great number of facts; those contained in his *Euterpe* are precious, but he leaves us in an uncertainty respecting a great many others. Strabo and Diodorus Siculus, have added but little to the narrative of Herodotus. Aboulfedha, by making us acquainted with the geography of his time, and the other writers of the thirteenth century, by means of their conjectures, have only served to augment our doubts. Besides this, Egypt so often subjugated, on changing its masters, must necessarily have changed its language also, and the different denominations of objects, that had either undergone modifications, or were no longer in existence, tended only to produce confusion in respect to ideas.

The authors of our own times have only been able to lay the ancient writers, and modern travellers, under contribution. In consequence of the

their researches, and more especially those of Danville, several learned dissertations have ensued, in conformity to which, that celebrated geographer hath constructed the only maps of ancient and modern Egypt on which we can rely.

It has already been perceived, however, in consequence of actual experiment, that the chart of modern Egypt abounds with many errors; and it would have been extremely difficult, notwithstanding the profound criticism employed by Danville, to have avoided them. The residence of the army, in these countries, will furnish an opportunity of rectifying the greater part of these mistakes; of obviating many doubts; of re-establishing a multitude of facts, almost forgotten in consequence of the lapse of time, and the barbarity of the different governments, which have hitherto precluded research.

The General in Chief having ordered me to recognize the lake of Menzaleh, the instructions transmitted, and the intelligence procured by him, enabled me to give more extent and precision to my operations, than military men, in similar cases, are able to exhibit. I shall now give an account of my labours; I shall state my conjectures; and I shall support them by recent enquiries.

quiries. In calling to my aſſiſtance a few geological facts, which I quote on the authority of the early writers, I am not to be conſidered as adopting them excluſively; on the contrary, I ſhall conſult nature, which exiſted before theſe authors, and which is at the ſame time our own contemporary.

SECT. I.

Of the Ancient Tanitic Branch, that has been rediſcovered.

IT was the opinion of the ancients, that the Nile emptied itſelf into the ſea, by means of ſeven mouths. It therefore had ſeven branches,* which receiving the waters on their leaving the mountains, conducted them to theſe ſeven openings.

* The poets have called theſe ſeven branches, the Mouths of the Nile *(ora)*; this denomination originated in the idea of grandeur which they wiſhed to annex to this river. But, in treating of the geology of Egypt, we are forced to eſtabliſh a diſtinction; we ſhall, therefore, denominate the canals, reaching from above Memphis to the Mediterranean, *branches*; and the openings of theſe branches into the ſea, *mouths*. This diſtinction is the more neceſſary, as ſome of the primitive branches are ſuppreſſed, either in whole or in part, while their mouths are found entirely inſulated, or forming communications between the different lakes of Egypt, and the ſea.

The

The order in which they knew them, was in the direction of from eaſt to weſt.

1°. The Peluſiac, or Bubaſtic branch.

2°. The Tanitic, or Saitic, which at preſent bears the name of Omm-Faredje.

3°. The Mendeſian, or branch of Dybeh.

4°. The Phatnitic, or Bucolic branch, which is that of Damietta.

5°. The Sebennitic, or branch of Burlos.

6°. The Bolbitine, or branch of Roſetta. And

7°. The Canopic, or branch of Abou-gyr.

Do theſe branches exiſt in whole or in part? And can the traces of them be diſcovered? This is what we are now about to examine, in reſpect to the firſt, which are included in the enquiry made by us.

The Peluſiac branch was navigable, when Alexander penetrated into Egypt; it was through it that he cauſed the fleet to aſcend, which he had brought from Ghazah: at preſent, however, this branch is filled up: the extremity, which is in the neighbourhood of the ſea, before Peluſium, is full of mud. The remains of it may be rediſcovered in the province of Charqyeh, by ſearching towards Baſtah, a ruined town, anciently known by the name of Bubaſtum, and which is perceived

perceived at ſome diſtance to the left of Belbeis, and on the road towards Syria.

An impenetrable obſcurity prevails relative to the Tanitic and Mendeſian branches, which come after the Peluſiac, and once occupied the ſpot where lake Menzaleh now is; it was formerly known by the name of lake Tennys.

When I had penetrated to the lake Menzaleh, by the mouth of Dybeh, on the 12th Vendemaire, I was ſtruck with the breadth and depth of the canal which lies to the right after you have paſſed the mouth. I began to think that this might be the extremity of the ancient Mendeſian branch, and I endeavoured to diſcover the direction, by frequently taking the ſoundings: the circumſtances accompanying my entrance did not permit me, however, to accompliſh that taſk.

But what I was not able to execute for the Mendeſian, I think I have performed for the Tanitic branch, the mouth of which is Omm-Faredje. On repairing from that mouth to Samnah, you firſt paſs to the right of the iſles of Tounah and Tennys, and then penetrate into the canal of Moez. The entrance is deep, and the bottom is compoſed of black mud. The anchorage

to

to the right of the iſles juſt mentioned, is from ſixteen to twenty decimetres. The left hand ſide is only practicable for ſmall craft, and the utmoſt limits of the navigation of the lake do not extend far beyond the line of their direction. The iſlets, and flats, connected with the ſouthern parts of theſe iſles, give reaſon to ſuppoſe that a large portion of land has been here ſubmerged.

The canal of Moez, which overflows the province of Charqyeh, penetrates into the lake Menzaleh, towards the ſouth-weſt of the iſles of Matharyeh. This canal, from Samnah as far as the lake, is from fifty to one hundred and twenty metres in breadth, and about three or four metres deep. It communicates with the Nile, and, during the time of the inundation, pours a large volume of water into the lake; this penetrates to a conſiderable diſtance without becoming ſalt. The banks of that canal are flat, a circumſtance which denotes that they were not conſtructed in modern times, as we ſhall ſee in Section V.

All theſe indications proved more than ſufficient to induce me to ſuſpect that the canal of Moez is merely a portion of the Tanitic branch, which is prolonged to the mouth of Omm-Faredje, and which has the towns of Samah, Tounah, and Tennys, on its right bank. I was confirmed

firmed in this idea, when I began on my return to conſtruct a chart of the lake, in conformity to the notes taken by me on this occaſion: for the direction of the canal of Moez, as well as that of the iſles of Tounah and Tennys and the mouth of Omm-Faredje, arranged themſelves in the ſame line, allowing merely for that natural curvature which water ever affects.

The traces of the Mendeſian branch, the mouth of which is Dybeh, may be diſcovered by repairing towards the canal of Achmoum, or what would be ſtill better, towards that of Fareſkour.

SECT. II.

Preſent State of the Lake Menzaleh.

THE lake Menzaleh is compriſed between a couple of large gulfs, each of which is cut into two ſmaller ones, and a low and narrow tongue of land, that ſeparates it from the ſea. Theſe gulfs re-unite and form the peninſula of Menzaleh, at the extremity of which lie the iſles of Matharyeh, the only inhabited ones in the whole lake. The greateſt extent of this collection of water, in the direction of weſt-north-weſt, is 8,385 metres [4,000 fathoms]; it extends from Damietta,

Damietta, to Peluſium: its ſmalleſt dimenſion, in a perpendicular line to the former, between Matharyeh and the mouth of Dybeh, is 23,400 metres, (12,000 fathoms).

The iſles of Matharyeh are very populous. The huts belonging to the inhabitants, are built either wholly of mud, or of mud and brick, and entirely cover their ſurface. In the iſle of Myt-el-Matharyeh, theſe cabins are huddled together along with the tombs, and appear rather to be ſo many receptacles of wild beaſts, than habitations for men. The population of this ſpot, excluſive of the women and children, amounts to 1100 men, who are occupied in catching fiſh and fowl.

They live under the command of forty chiefs; theſe in their turn depended on Hhaçan-Toubar, who hired the fiſhery of the lake of Menzaleh from the Beys; in addition to this he was one of the richeſt men in all Egypt, and perhaps the only one who dared to accumulate ſo much landed property. His family came originally from Menzaleh; it reckoned from four to five generations of Cheykhs. The authority of Hhaçan-Toubar was very conſiderable; it proceeded from his credit, his riches, his numerous kindred, the great quantity of people employed by him, the and ſupport of the Bedouins, to whom he

he gave lands to cultivate, and whose chiefs he loaded with presents. These different tribes of Arabs could enter the canal of Mo'es by that of Sfalehhyeh, which communicates with it, and thus reach to the lake, in order to join the inhabitants of Menzaleh and Matharyeh.

The latter, having neighbours such as these, and being the only proprietors of from five to six hundred vessels which navigate the lake, became the tyrants both of it, and the country imediately adjacent. Their commerce consists in fresh and salted fish. The roe of the mullet also furnishes *poutargues*, and during the time they are employed in catching it, from forty to fifty families live in little cabins, composed of mats, near the mouth of Dybeh, opposite to the extremity of the islands.

The fishermen of lake Menzaleh and the Bedouins of the villages are alike covetous and ignorant. They are not acquainted with the division of time into hours, nor like the Arabs of the desert, can they tell the period of the day. The rising, the setting of the sun, and noon, are the only portions of the twenty-four hours which they distinguish, and it is merely by supposing themselves at home, and by connecting the portions of the day just alluded to, with

the idea of diſtances, that one is enabled to acquire any idea relative to the poſition of their reſpective cantons.

Menzaleh, which has given its name to the lake, is an inconſiderable town, in part ruined, ſituated on the right bank of the canal of Achmoum, at three leagues diſtance from Matharyeh, and ſix from Damietta; its population conſiſts of nearly 2000 inhabitants; it poſſeſſes ſome manufactures of ſilk ſtuffs and ſail-cloth, with which it ſupplies Matharyeh; it alſo has a few dyers, and carries on ſome other trifling branches of trade.

In lake Menzaleh there are ſome iſles formerly inhabited, but now covered with ruins; they riſe conſiderably above the level of the ſurrounding waters which induces their inhabitants to give them the appellation of mountains*. We ſhall make it appear hereafter, that theſe iſles were formerly towns, which had belonged to a large tract of land, ſince ruined by the waves.

The iſles of Tennys and Tounah appear to be the moſt conſiderable. The former has preſerved its ancient name, while Tounah has adopted that of Cheykh-Abdallah, from Cheykh or Santon, to whom a tomb had been erected

* They ſay: the mountain of Tennys, the mountain of Tounah, the mountain of Sammah.

here

here. According to the obſervations of Volney, the various denominations of *Cheykh*, *Santon*, *fool* and *ideot* are ſynonimous. The Santons, who during their lives attract the aſtoniſhment of the nations of Aſia by the gloomy extravagance of their actions, after their death have tombs erected to their honour, which are greatly revered; theſe excite the zeal of the faithful, whoſe piety prevails on them to depoſe ſome alms there for the poor. Have not our own chapels and oratories ſpread over the country, or ſcattered along the highways, with their begging boxes, their ſolitary lamps, and the images traced on their walls by the pencil of ſuperſtition, the ſelf-ſame object.

The iſles of Lake Menzaleh, which are nearly on a level with the water, are uncultivated, barren, and devoid of any other productions except marine plants. Some of them poſſeſs the tombs of certain Santons, which, on this uniform ſurface, are the only remarkable points of direction we could find for the conſtruction of our chart.

The taſte of the waters of Menzaleh is leſs diſagreeable than that of the ſea. They may be drunk during the inundation of the Nile, at a pretty conſiderable diſtance from the mouth of the canals which diſcharge themſelves, like that

of Mo'ez, into the lake. They are brackish and unpalatable in those parts where there is a communication with the rice fields.

The waters of the lake are phosphoric, and the air is very healthy; it is more than thirty years since the inhabitants of Matharyeh experienced the plague.

The general depth amounts to a metre; from two to six metres may be found in the direction of the ancient Tanitic and Mendesian branches. The bottom of the lake consists of clay mingled with sand, at the mouths; of black mud in the canals of Dybeh or Omm-Faredje; of slime, or slime and cockle-shells every where else: in many parts it is covered with moss.

The Menzaleh abounds in fish; the entrance of the mouth is frequented by porpoises. We saw but few birds, but there are many in such of the marshes along the sea, as had been abandoned by the waters.

The lake is navigated by means of sails, oars, and poles; a contrary wind, provided it be strong, renders the passage twice or thrice as long as it would otherwise be. They anchor by means of two poles, which they easily stick in the mud, one at each end of the vessel. The fishing boats are nearly of the same form as those o the Nile;

that

that is to ſay, the prow is about ſeven decimetres more elevated than the poop. In the former, the ſtern alſo dips more into the water; this affords a greater degree of facility to the fiſherman, who ſtands on the deck, on purpoſe to hand, to throw, and to draw up his net.

When the inhabitants of Matharyeh intend to fiſh at a diſtance from their own iſles, they take on board a quantity of freſh water in large jars, which are tied to the foot of the maſts of their germes; each germe carries one.

The fiſhermen of Matharyeh appear to form a ſeparate claſs. As they prohibit their neighbours from enjoying the advantages of the lake, they have but little communication with them. Nearly always naked, generally employed on the water, and occupied continually in a laborious calling, they are ſtrong, vigorous, and determined. They poſſeſs fine figures, but their aſpect is ſavage; their ſkin is burnt with the ſun, and their beard, which is both black and harſh, renders their appearance ſtill more hideous. In preſence of their enemies, they utter a thouſand barbarous cries, accompanied with a moſt furious howl; they at the ſame time ſtrike a kind of tambourin, the decks of their boats, or any thing that will occaſion a noiſe; they apply the buc-

cina to their mouths, and make its concl utter the famous *rouhh*;* "if we were militia," exclaimed our volunteers, "this noiſe would affright us, and we ſhould jump into the water." It is thus that the French ſoldier on every occaſion preſerves his gaiety, and by means of ſome merry ſaying, either prevents the tedium of life, or baniſhes every idea of danger.

The lake of Menzaleh only communicates with the ſea by means of two practicable mouths, thoſe of Dybeh and Omm-Faredje, which are the Mendeſian and Tanitic openings of the ancients.

Between theſe there exiſts a third, which would alſo communicate with the ſea, were it not for a factitious mound, formed of two ranks of ſtakes, the interval between which is filled with marine plants. A ſimilar mouth, only that it was cloſed up, lies beyond that of Omm-Faredje. Theſe openings were known to the ancients, and Strabo deſignates them by the name of ψευδοστόματα, (pſeudoſtomata,) falſe mouths.

The tongue of land, which ſeparates the ſea from the lake, and extends from the Phanitic

* *Rouhh a'nny yakelb !* that is, retire form me, thou dog !

mouth

mouth, or that of Damietta, to the Peluſiac mouth, has only four interruptions in an extent of about 86000 metres. This tongue, which is pretty broad between Damietta and Dybeh, and between Omm-Faredje and Peluſium, is narrow between Dubeh and Omm-Faredje; it lies very low, remains uncultivated, and, like the ſides of the lake, is covered in ſome places with marine plants. The ſhore does not abound in ſhells, flints, &c. there are only a few pumice-ſtones, which the ſea carries thither. The moſt common kinds of ſhells are the buccinæ, and bivalves of the ſmalleſt kinds.

Each mouth is ſhut up towards the ſea by a bar of bank, forming a portion of a circle, the extremities of which join the ſhore. Theſe bars differ, in reſpect to the ſurf, from that at the mouth of the Nile near Damietta; but they exhibit the ſame figure and poſition, in reſpect to every thing elſe. As the wind elevates the waters of one of the channels nearly ſix decimetres, and ſometimes more, the banks may be eaſily paſſed by veſſels of ſmall burden.

In order to produce a ſurf on theſe bars, a conſiderable current at the opening would be neceſſary; that which prevails in a ſmall degree there,

is occaſioned by a ſort of balance between the waters of the lake and the waves of the ſea, during and after the ſolſtice, as we ſhall ſee hereafter.

At the time of the ſummer ſolſtice, the north-weſt wind drives the waters of the ſea on part of the coaſt of Egypt, detains them there, and cauſes thoſe of the Menzaleh to flow back on its ſhores, and cover the low iſlands ſcattered over its boſom; the lake itſelf receives the inundation, which enters it from the ſurrounding canals. This vaſt baſin, at that period, reſembles an immenſe plain; but when the north-weſt wind ceaſes to blow, the waters of the Mediterranean falling back, in conſequence of their own gravity, leave a ſhore of about two hundred metres wholly uncovered; the flood occaſioned by the Nile begins to diminiſh; the waters of the lake retire from that part of the iſles which they had covered, in proportion as the inundation abandons the ſoil of Egypt, and forms a current at the mouth of Dybeh and Omm-Faredje, the celerity of which is tantamount to about 3000 metres an hour, which, at the end of a certain period, will of courſe occaſion a ſenſible diminution of the lake.

Egypt

Egypt then ought to be conſidered in two points of view; the firſt at the epoch when the waters cover the country, the ſecond when they have entirely run off.

SECT. III.

Preſent State of the Lands in the Neighbourhood of Lake Menzaleh.

THE territory adjoining the Menzaleh is partly barren and partly cultivated. From the mouth of the Nile to the Peluſiac opening the tongues of land, reaching along the ſea-coaſt, are ſterile; the plain of Peluſium, and the borders of the lake, as you aſcend towards the province of Charqyeh, conſtitute a deſert. That province is overflowed by the canal of Mo'ez; the ſame canal, and that of Achmoum, inundate a part of the diſtrict of Menzaleh. The canton of Fareſkour receives the waters of the canal of the ſame name; the peninſulas of Damietta and Menzaleh are covered with beautiful rice grounds, ſupplied by channels deſtined for irrigation, the ſurplus of which is drained by means of cuts made expreſsly for that purpoſe.

The communication between the canals of Euſeb-

Euſeb-el-Kache (Qaſſab-el-Qach) and Douhaz-Selameh, at a league above Damietta, has impreſſed me with a proper notion of the ſyſtem of irrigation purſued in theſe parts, and alſo the means of gueſſing, without taking the level, of the difference of height between the waters of the Nile and thoſe of the lake.

The firſt canal derives its waters from the Nile, and directs its courſe towards the Menzaleh, without having any communication with it; it is ſhut up by means of banks of earth, and furniſhes proper channels for watering.

The ſecond communicates with the lake alone; it is lower than the canal of Euſeb-el-Kache, (Qaſſab-el-Qach) near to which it is placed, and is only ſeparated from it by a narrow mound; this is deſtined to receive the waſte waters from the rice grounds.

On comparing the height of the waters of theſe two canals at the upper part of the dyke which ſeparates them, on the 15th Vendemaire, the difference between the depth of the firſt and that of the ſecond, amounted to thirty-five centimetres; which contained an eſtimate, for that day, of the elevation of the Nile above the correſpondent part of the Menzaleh; for the compariſon between theſe two heights muſt vary according to

the

the reciprocal fall of the waters of the Nile and thoſe of the lake. Below Menzaleh there are two canals, which are collected in a ſimilar manner; and others of the ſame kind muſt exiſt in the gulph of Fareſkour. A nilomen-zalometre placed at each of theſe points would afford a daily ſtatement of the variations.

The land deſtined for the rice grounds is divided into compartments, ſurrounded by little mounds, with ſluices to open and ſhut at pleaſure, in order to receive or diſcharge the waters.

The fields in which the grain is ſown, and the ſquares for producing marine ſalt by means of evaporation, are diſpoſed in the ſame manner. In the latter proceſs the water is only ſubjected to a firſt evaporation, by its reſidence in a ſeparate reſervoir; when it is once concentrated, it is introduced into the compartments, where it is ſpread thin on the ſurface. The ſea water is conducted into a reſervoir a little lower.

When they intend to ſow, they begin by preparing the ground; they then water it, and, at the end of twenty-four hours, when the earth becomes ſufficiently moiſt, ſeveral men make their appearance, rake up the ſoil with their hands, reduce the inequalities, and caſt away ſuch of the clods as are too hard. This operation being

ing performed, they let off the water; ſoon after this they ſow the ſeed, and, at the end of a few days, the country is covered with verdure. We obſerved that the waſte ground on the borders of the canals deſtined for the purpoſe of irrigation, is employed in the ſame manner as dung; it is placed in heaps in the fields, before the furrows are traced, exactly according to the mode followed in Europe.

When a fall of water cannot be obtained, that element is introduced by means of a wheel, either with buckets appended, or furniſhed with hollow felloes: theſe laſt are uſed in preference, when the level of the alimentary canal is not too low.

Such is the manner of cultivating the lands in the neighbourhood of Damietta and Menzaleh. The latter of theſe poſſeſſes two ſalt marſhes, adjoining to the lake, in that part compriſed between the two branches into which the canal of Achmoum divides itſelf below the town; theſe ſupply a large quantity of ſalt, which is obtained by the proceſs alluded to above; it is extremely white, and is chryſtallized in layers of from ſix to eight millimetres in thickneſs.

One of the branches of the canal of Achmoum takes a direction towards Al-Sſafrah: its water ſerves to ſupply the rice grounds, and alſo to furniſh

niſh the people of the iſles of Matharyeh, and thoſe of the neighbouring villages, with drink, during the inundation. The inhabitants take advantage of this favourable moment to fill the public ciſterns, which are large reſervoirs, open at the top, built of maſonry, and rendered tight at the bottom and ſides, by means of an excellent cement; about five metres of water are introduced into it.

When this quantity is exhauſted, wells of three metres in depth are dug, which furniſh an abundant ſupply. It is not at all extraordinary that the water ſhould flow into theſe artificial ciſterns, as they are dug in ground ſaturated with water during four months of the year, the lower bed of which being compoſed of a viſcous clay, becomes capable of retention.

SECT. IV.

Formation of Lake Menzaleh.

IN conſequence of what we have ſaid relative to the direction of the Tanitic and Mendeſian branches in ancient times, it appears that theſe traverſe the ſpot now covered by lake Menzaleh. This, then, is not a maritime lake, ſimilar to

thoſe

thoſe on the coaſt the *ci-devant* Languedoc and Rouſſilon; it has not, therefore, always exiſted: but what may be the cauſe of its formation? This is preciſely what we ſhall now endeavour to explain.

I have already obſerved that this is not a maritime lake. The nature of the bottom of the Menzaleh, which every where abounds with the ſlime of the Nile, and alſo the depth of its waters, which generally amounts to a metre, while it is ſtill more conſiderable in the preſumed direction of the Tanitic and Mendeſian branches, evidently announce that the baſin of the Menzaleh has been formed by the overflowings of the Nile, and not by any commotion on the part of the waters of the ſea.

I muſt obſerve, in the ſecond place, that this lake could only have been formed in conſequence of the rupture of equilibrium between the ſea and the Tanitic and Mendeſian branches. According to Herodotus, the Phanitic branch, or that of Damietta, having been dug by the hands of men, cannot have been near ſo conſiderable as it appears at this day; it is probable that its volume has been augmented at the expence of the Peluſiac, Tanitic, and Mendeſian branches; and in proportion as the two laſt became impoveriſhed, they were

were no longer in a ſituation to preſerve an equilibrium with the waters of the ſea, in conſequence of which, its waves have penetrated thither. They would experience leſs oppoſition in reſpect to this, as the north-weſt wind, which blows conſtantly, during many months of the year, on the coaſt of Egypt, by elevating the level of the Mediterranean, determines its waves, as we have already obſerved, towards the land. The action of this wind is ſo violent in the neighbourhood of Damietta (and it is, of courſe, the ſame elſewhere), that the largeſt trees, ſuch as the ſycamores for inſtance, bear towards the ſouth, while their heads, which are deprived of branches on the northern ſide, are rounded and ſhorn as if they had been cut by ſhears.

Two modern facts relative to Egypt ſupport our conjectures.

At the beginning of the preſent century the ſea made an irruption on the ſhore between Alexandria and Roſetta, and there formed ſeveral violent currents *. At a nearer period, when it was attempted to re-open the canal Fara'ouny (the canal of the Pharrocks) the waters of the Nile precipitated themſelves in this new direc-

* See Paul Lucas, vol. 2. p. 19. and ſeq.

tion,

tion, the branch of Damietta experienced a diminution, the waves penetrated a conſiderable way into this branch, and the ravages became ſo great, that they were ſoon forced to ſhut up the entrance of this channel, which they had opened without taking the neceſſary precautions. It is probable that the lake of Bourlos has been formed in the ſame manner.

In reſpect to the damage done to the land in conſequence of the irruption of the waves, and their commotion in the baſin occupied by the lake Menzaleh, did not the rupture of the dykes of the Meuſe, about the year 1430 or 1440, convert into a large lagoon, abounding with barren iſlands and ſhallows, which are now navigable, an immenſe extent of country, including more than one hundred villages, and much land capable of cultivation: this moraſs bears the name of *Bies Bos*: that is, the foreſt of bull-ruſhes.

The increaſe of the branch of Damietta is not the only cauſe of the failure of the Tanitic, Peluſian and Mendeſian branches: the bad management of the rivers, and the neglect of the canals, have contributed to it, as well as the poſition of the country.

Upon a proper examination of the iſthmus which divides the Red Sea from the Mediter-

rancan, it will be ſeen that mount Mokatham and mount Caſius (Louga) are the promontories of that ſea of ſand; and the point which almoſt inſenſibly unites them (ſcarcely perceived by the eye, but which nevertheleſs exiſts in nature) marks the ſeparation of the gulph of *Soues* (Suez) from that of Gaza. Thus, topographically ſpeaking, the Nile rather belongs to Africa than to Aſia*. The Nile running at the back of the mountains on the ſide of Africa, ſhould have its courſe towards the weſt; ſince it is known that the waters of a river are ſubject to two declinations, the one in the direction of their length, and the other depending on the general topography of the country, which latter determines the principal current of this river, by more particularly affecting that of the two ſhores, which are contrary to the general declivity of the country.

When the principal current meets with a counter-current, as happens in the Rhone, which is ſupplied from the mountains of the *ci-devant Vivarais*, it is not then ſo eaſy to form canals which originate from the coaſt; but at the ſame time no burſting of the banks need be dreaded; but the contrary takes place in different circum-

* It is known that the Nile formerly divided Africa from Aſia. See Pliny.

ſtances. Nevertheleſs there is nothing to prevent the direction of a river from being changed by appropriate works.

What we have already ſaid appears to be confirmed in Egypt. The works of the canal of Youçef, of the lake Mæris, and thoſe of the pier, which an ancient king of Egypt cauſed to be built, *, in order to turn aſide, upon the right bank, the river which runs among the little hills of Lybia, and by that means ſtruck with ſterility all the eaſtern part of the Delta.

In all caſes, the placing of bridges, of banks, piers, and other preſervative works, ought to be ſubordinate to the conſiderations which we have already ſtated; for nature will not be contradicted with impunity.

Although the topography of the diſtrict may have contributed to the ſuppreſſion of the Peluſian, Tanitic and Mendeſian branches, the waters of the Nile have not the leſs preſerved a tendency towards thoſe branches; ſo that it would not be impoſſible to re-eſtabliſh them. One circumſtance alone, that of the elevation of the bed of the Nile, which ought to produce an elevation in the heighth of the waters, renders this opinion

* According to Herodotus, it was *Menes* who conſtructed that fine work.

extremely

extremely probable. By re-eſtabliſhing the Tanitic and Mendeſian branches, the lake Menzaleh would be drained. But, in order to judge of the means which ought to be employed for this purpoſe, it may be proper to examine in what manner the Delta was formed: theſe two queſtions have an immediate connection.

SECT. V.

The drying up of the Lake Menzaleh.

The phyſical property of banks for the purpoſe of regulating the courſe of a river is to contract the volume of its waters, and conſequently to augment their depth; and ſince a river ſo regulated abounds with mud, the effect of theſe banks is to raiſe the bed of the river, becauſe the waters depoſit much leſs mud than if they were diffuſed over a larger ſurface.

Before the Mincio and the Po were banked, the deeps *(crues)* did not extend up to Mantua *, but now they reach even to Lake Inferior.

Since 1607 the beds of thoſe rivers have been raiſed twenty-three decimetres one-third, by the

* Bertazzolo, *Del Soſtegno di Governolo.*

depoſit of mud *; and, as in great inundations, the waters of the Po reach the heighth of the Superior Lake, and the difference of level of the lakes is two metres, we ſee that ſince the Po and the Mincio have been confined within banks, or dykes, the Po riſes to the heighth of 43 decimetres, which it by no means reached formerly.

It follows, that ſince the low plains adjacent to the courſe of this river have not been inundated, either by its waters, or by thoſe from other quarters, the bed of the Po is elevated above them; and theſe plains dried up by draining, are perpetually threatened, during the floods of the river, with a total ſubmerſion, by the burſting of the dykes †.

The effect is the ſame in the countries which are watered by the banked rivers of Italy, Holland, Zealand, and Maritime Flanders, thoſe deltas, formed by the depoſits of the Rhine, the Meuſe, and the Scheldt, but which have been

* Abbati Mari, Mantovano, *Idraulica pratica ragionata.*

† Citizen Dolomieu has given ſimilar views of this ſubject, in his excellent memoir on Egypt, publiſhed in 1794. I am extremely flattered by finding that my reaſonings agree with thoſe of that able naturaliſt, with whoſe work I previouſly wiſhed to become acquainted.

preſerved

preſerved by the banks from ſubſequent inundations, exactly in the ſame circumſtances.

I conclude then, that *when a low plain waſhed by the ſea, is croſſed by rivers, which bring with them much mud, and is elevated to the height of the greateſt floods, ſuch plain muſt have been formed by depoſits from inundations.*

Now let us apply to the Nile what we have juſt ſaid of the Po. We can the more eaſily form a compariſon between theſe two rivers, becauſe they have each of them long courſes, abound with mud, have periodical inundations, and run into the ſame ſea.

Before the courſe of the Nile was regulated, the waters, iſſuing from the mountains, diffuſed themſelves like thoſe of the Po, upon a great ſurface, which they inundated during the whole year. Seſoſtris collected the waters of the Nile into channels below Memphis, confined them within banks, and in this manner formed ſeveral deltas. Now, if the ancient Egyptians had excluded the waters of the river from thoſe deltas, not only, from the nature of the climate, would they have been deprived of cultivation, but agreeably to the principles I have juſt laid down, inſtead of ſeeing the Nile run between natural

banks, we ſhould have had a river confined by artificial dykes, which would have held poſſeſſion of the ſoil of Egypt.

Let us conclude then that the deltas of Egypt has been formed by inundations, favoured by the labours of man.

The deltas, too much limited between the two preſent branches of the Nile, ought to be conſidered as bounded by the mountains which ſtretch to the weſt, towards Alexandria, and by the hills which form the termination of mount Mokatham. The direction of the ancient branches whoſe regularity indicates the labour of man, announces that the extent which the ancient Egyptians had attributed to the Delta was the deſign of nature.

After what we have ſaid, the draining of lake Menzaleh is reduced,

1ſt, To find the direction of, and to dig anew the Tanitic and Mendeſian branches.

2dly, To introduce into partial deltas the waters of the Nile, during the inundations, in order to obtain mud. This can be done without danger, becauſe there is an immenſe diſcharge of the waters of the Nile, by the branch of Damietta, and the canal of Mo'ez.

3dly,

3dly, To make cuts, ſhut with flood-gates, in the part of the country between the reſtored branches of the river.

4thly and laſtly, To open the flood-gates, when the waters of the ſea retire from the coaſt, in order that the waters of the Nile may flow out after they have depoſited their mud.*

All theſe operations, though practicable, require to be performed with much ſkill and caution, that the Damietta branch may not be too rapidly exhauſted. The channel of this branch muſt afterwards be narrowed.

Herodotus was the firſt who maintained that the Delta was formed by the river Nile. This opinion has been diſputed by modern authors. Freret (*Memoirs of the Academy of Inſcriptions*, 1742), ſeduced by the ſpirit of ſyſtem, has combated it with the greater zeal. He has gone ſo far as to doubt whether the mud which the Nile carries down in its inundations, can form a de-

* The Tranſlator has endeavoured to do almoſt *literal* juſtice to this memoir; but cannot flatter himſelf with having always perfectly underſtood the original, which certainly is not remarkable for perſpicuity, much leſs for elegance or ſolid reaſoning. It is one of the few, in this collection, which bear evident marks of having been too haſtily written.

poſit. But how have the canals of Egypt been filled up, if not by the ſlime of the Nile? Why ſuppoſe that the waters which ſpread laterally, and which are, of courſe, leſs rapid, ſhould not depoſit the ſubſtances with which they are charged, while this depoſit is performed by the waters confined in the different channels of the Nile, the rapidity of which is leſs ſubject to change?*

Herodotus was alſo the firſt who diſcovered the cauſe of the formation of ſprings, which was not confirmed until the laſt century, and of which Deſcartes gave an ingenious, but little probable explanation. Thus we no longer doubt the exiſtence of that beautiful mechaniſm, the circulation of the waters of the mountains towards the ſea, and of the waters of the ſea towards the mountains, determined by evaporation and by the intervention of winds and hills. The influence of oppoſite temperatures ought alſo to be added; for I believe it may be aſſerted, that *in a central*

* There was found at Roſetta, four feet under ground, a ſlab of granite with three inſcriptions, one in hieroglyphic characters, another in Syriac, and a third in Greek. The Greek and Syriac inſcriptions expreſs the ſame thing viz.—*That Ptolemey-Eupater had employed ſeven years and a half in clearing out all the canals of Egypt.*

and

and elevated chain the clouds do not paſs the line of the middle of the ſuſpended waters, becauſe that line ſeparates two climates. The necks of the mountains are the parts moſt acceſſible and penetrable from this line; and though not ſo elevated, they are not the leſs placed within the vortex of atmoſperic revolutions.

This principle, combined with the explanation of the prevailing winds of the ſolſtice, accounts for the periodical rains which occaſion the overflowings of the Nile, and afterwards thoſe of the Niger, a river which flows behind the mountains of Ethiopia.

The manner in which we have explained the formation of the Delta leads to a concluſion, that the bottom of the Nile is raiſed in proportion as the adjoining ſoil is elevated. But what is the relation between the increaſe of the ſoil and the increaſe of the bottom of the river? and what is the probability that the inundations of the Nile may not either prove inſufficient or be too great? Theſe queſtions are not eaſily reſolved.

It is certain, however, that in ordinary inundations, the waters of the Nile by no means cover the whole of the ſoil of Egypt, and it appears that this was alſo the caſe in the moſt diſtant periods.

The

The ancient Egyptians were convinced, that it was neceſſary they ſhould be able to direct the waters of the Nile, leſt ſome portions of their territory ſhould be deprived of one of the principles of vegetation. Hiſtorians pretend that lake Mæris was dug to regulate the inundations of the Nile. The waters which flowed into this immenſe reſervoir, and which were retained or diſtributed at pleaſure, by means of the canal of Youcef, ſupplied, it is ſaid, the deficiency of imperfect inundations, and when the flux was extraordinary, delivered the ſoil from the waters by which it would have, otherwiſe, been too long covered. This may be conſidered as the moſt ſublime idea that ever was ſtarted, and at the ſame time, the beſt calculated to promote the true proſperity of a country.*

The canal through which the waters of lake Mæris, or rather thoſe of the Nile, flow into Upper Egypt, and to lake Mareotis, ſtill exiſts, but is much waſted towards the end of its courſe.

* In the paper on *the valley of the lakes of Natron, and on that of the waterleſs River*, it will be ſeen what opinion has been formed with reſpect to lake Mæris, and the primitive ſyſtem of the waters of Egypt.

The

The part of the province of Behhyreh, adjoining the deſert, which its waters formerly fertilized, is now uncultivated.

SECT. VI.

Nature of the Tongue of Land which ſeparates Lake Menzaleh from the Sea.

FROM what we have ſaid in this eſſay, it appears that the geology of Lower Egypt depends upon very ſimple principles. Great currents, volcanoes, earthquakes, and thoſe violent ſtorms which are regarded as melancholy events, and the recollection of which is long impreſſed on the mind, being unknown to Egypt, the ſtrata muſt preſerve the general affections of the ſubſtances of which the ſoil is formed, and the modifications of theſe ſtrata muſt follow the action of the elements (which, in this country, is always uniform) combined with the laws of motion, and the reſiſtance of the obſtacles oppoſed.

The rains, which fall regularly every year during the ſummer ſolſtice, on the mountains of Abyſſinia, rob thoſe elevated ridges of their ſoil, to enrich the valleys of the Nile and the Delta.

The matter carried down by the Nile is depoſited at every point where the rapidity of the current

current is diminiſhed. The ſoil, over which the water ſpreads, becomes more elevated. The depoſits alſo form banks of ſand which produce changes in the courſe of the river, aſſiſt in the formation of bars, and the extenſion of ſhoals.

During tempeſts the winds raiſe the ſands from the bottom of the ſea, and drive them towards the coaſts. At low water the wind again ſeizes the dry ſand, and blows it into the mouths of rivers. Thus ſhoals and downs are formed, and bottoms covered with concealed rocks are converted into flat ſhores.

The lateral current which follows the coaſts of the Mediterranean, from weſt to eaſt, combines with the courſe of the branches of the Nile, and, in conſequence of a diminution of rapidity, produces on the left, between the two principal currents, an accumulation of ſoil which ſhoots out into points more or leſs acute, while the ſhore to the right, included between the direction of the courſe of the river and that reſulting from both currents, aſſumes a round form.

The ſubſtances carried forward by this combined motion contribute to the extenſion of the ſhores, particularly thoſe on the right, from which originate the elevated points that appear between

between Damietta and Peluſium, as well as the ſunk rocks, and that long ledge which is prolonged under water, and which prevents any good anchorage near the coaſt. The nature of thoſe anchoring-grounds is likewiſe ſubordinate to the direction of the ſands and ſlime of the river. The bay of Damietta, on the left of the mouth of the Nile, has a hard bottom of black clay, while the bottom of the roads of Bougaſeh and of Cap-Bouyau, ſituated to the right, conſiſts of ſoft, yellowiſh mud, and here veſſels ſometimes give chace to each other for two or three leagues, without incurring danger.

Analogy induces us to believe that the ſhores which connect Cap Bourlos and Behhyreh with the branches of the Nile, owes their formation to ſimilar cauſes.

Finally, the lateral currents, during their ordinary motion, or when acted upon by the weſterly winds, meeting in the Gulph of Ghazah, form agitations, the effect of which is too little known and too little ſtudied, but which contribute to the extenſion of that ſhore.

Meanwhile, if we conſider that from the Delta to the ſummit of the Abyſſinian mountains, the Nile flows between two ridges of hills which are calcareous as far as Açouan, and formed of gra-

nite

nite in the upper part, we will have a pretty good idea of the geology of Egypt. The hills which ſkirt the deſerts of Lybia on the ſide of Lower Egypt appear to be ſandy: they are covered with quartzous gravel, but the nucleus is calcareous rock. This is obvious on deſcending into the wells of the mummies of birds above Sſakharah, on entering the catacombs adjoining the pyramids of Djyzeh, or on examining the ſphinx, and even the ſoil on which the pyramids are erected.

SECT. VII.

Notice on the Towns which communicate with Lake Menzaleh.

The part of Egypt which I have viſited exhibits every where the appearance of a great depopulation. The towns of this diſtrict, ſituated on the way from Syria, lay in the path of conquerors, and muſt have ſuffered from the preſence of invading armies principally compoſed of barbarous people, and commanded by ſuch chiefs as Cambyſes or Omar. But the principal cauſe of their decay has doubtleſs been the ſuppreſſion of the Peluſiac, Tanitic and Mendeſian branches of the Nile.

On the banks, or in the neighbourhood of theſe

theſe branches, there were conſiderable towns, ſuch as Tennys*, Tounah, Samnah, Peluſium, and others of leſs importance.

The ruins of Tennys and Tounah are now ſurrounded by water, and belong, as we have ſaid, to Lake Menzaleh. Like all the towns which were ſubject to inundations, they were built on cauſeways. The ſoil, interſperſed with ruins, is at preſent entirely uncultivated. A kind of criſtalization has covered the ſurface, and the earth crackles and crumbles under the feet like ſnow which has juſt begun to freeze. This renders travelling very diſagreeable in theſe iſlands.

Tennys was a large city; a wall flanked with baſtions, and a ditch filled with water, ſerved to defend it. Now it does not preſent a ſingle habitation or veſtige of baths; ſubterranean ruins, vaulted with much art, the walls of which are lined with a very hard cement in excellent preſervation; fragments of a rectangular baſon of red granite: ſuch are the only objects that can be diſtinctly traced in the midſt of immenſe ruins of bricks, porcelain, pottery, and glaſs of every colour. The people of the ſurrounding country

* Tennys, a Roman town, built on the ruins of an Egyptian city, flouriſhed in the time of Auguſtus.

are

are conſtantly exploring this iſle, whence they dig up materials proper for building their habitations.

In this manner are conveyed the columns, pedeſtals, capitals, and other remains of antiquity, which are placed in ſo barbarous a manner in the moſques and principal edifices, or introduced into more ordinary buildings. Thus the ſite of the entrance of the branches of Damietta is a fragment of a very fine obeliſk, ornamented with hieroglyphics. We alſo found in that city a door-way, on each ſide of which was a pedeſtal full of inſcriptions, the one in Greek, the other in Latin, and in a moſque a column of ruined grey marble, with a Greek inſcription a little defaced.

Tounah was a leſs conſiderable place than Tennys. In the former we were ſo fortunate as to meet with an antique cameo, lying on the ground.* It is of agate, meaſures 36 millimetres by 29, and repreſents the head of a man in profile, which has a great deal of character. Its penetrating eye, frigid air, and diſdainful lip, afford reaſon to imagine it was intended for that Auguſtus who reſiſted Cleopatra's charms, and

* This cameo is now in the poſſeſſion of Madame Bonaparte, to whom it was brought by the General.

ſurmounted

ſurmounted every obſtacle that ſeparated him from the poſſeſſion of power.

Samnah* ſtands on the banks of the canal of Mo'ez. It appears to have been an immenſe city, and to have extended a conſiderable way along the canal. Within its confines is a kind of forum or public ſquare of an oblong form with a grand entrance towards the canal of Mo'ez, and avenues on each ſide. The longer axis of the parallelogram is eaſt and weſt, and on this line are various monuments of antiquity in ruins, and obeliſks broken and thrown down. When we reflect on theſe immenſe remains, our wonder is equally excited at the efforts neceſſary to break them ſo near their baſes and throw them down, and at the means that muſt have been employed to raiſe them. Time has ſpared the hieroglyphics on one of theſe obeliſks, of which a drawing has been taken.

Samnah is now the market for dates brought from Sſalehhyeh by the fiſhermen of the lake, who take them in exchange for their ſalt-fiſh.

Peluſium† is ſituated at the eaſtern extremity of

* Samnah, (San) was the ancient Tanis, called in the Septuagint tranſlation of the Bible, which was made in the country, Tzoan (Ζοαν) whence comes San. *(d'Anville.)*

† So called from the Greek word Πηλωσιον, mead. The Arabs preſerve this appellation in its preſent name Thyneh.

the lake Menzaleh, between the ſea and the ſand hills, in the middle of a ſmooth, naked, and barren plain. The extremity of the Peluſian branch, which is now almoſt entirely reduced to a great channel of mud, traverſes this plain from the lake to the ſea. The caſtle of Thyneh, which is falling to ruins, is on the bank of this channel, but at a conſiderable diſtance from the ſhore. It appears to have been built about the time of the conqueſt of Selim. The ruins of Faramah are to the eaſtward of Peluſium toward the ſea.

After paſſing the bar at the mouth of the Peluſian channel, there is, for a certain ſpace, depth of water ſufficient to ſhelter a flotilla of little veſſels. It was from this place that the veſſels of the lake of Menzaleh carried on a contraband trade with Syria.

The road that leads from the mouth of Omm-Faredje to Katthieh (Qathy'eh*) paſſes to the weſtward

* Katthieh (Qathy'eh) ſeems to be the place which Quintus Curtius (lib. iv. c. 7.) calls Alexander's camp. "Seven days," ſays that writer, "after the departure of "Alexander from Gaza, he arrived in that part of Egypt "now called the Camp of Alexander. Thence he cauſed "his infantry to file off towards Peluſium, and embarked "on the Nile with a ſmall eſcort of choſen men." Katthieh, on account of ſome very abundant wells, was the only place

weſtward of Thyneh, and through Peluſium; but is extremely muddy, and it is better to go nearer to the Peluſian mouth.

We may ſhew by the way that the elevation of the ſand-hills to the eaſtward of Peluſium, and which extend upward towards the province of Charqyéh, ſhow that the canal of junction between the Arabian Gulph and the Mediterranean Sea, could not end any where but at the Peluſian branch, and at a conſiderable diſtance from the mouth of that branch. Hence this canal muſt have been carried from the Nile, towards the Red Sea, and the fear of an irruption of this ſea towards the Mediterranean (which, however, I imagine unfounded, and which might have been prevented by proper ſluices) thus becomes much leſs probable.

On the plain of Peluſium, going from the ſea toward the ſand hills, and till within a ſmall diſtance from the latter, are found ſhells, at firſt in great abundance, but afterwards in ſmaller

place the Macedonians could find for an encampment, the ſeventh day after their departure from Gaza, and it is alſo the neareſt point for troops to file off upon Peluſium. The march from Gaza to Katthich (Qathy e'h) which the ſoldiers of Alexander performed in ſeven days, was accompliſhed in ſix by thoſe of Bonaparte.

quantities; the ground is alſo covered throughout its whole extent with a ſaline cruſt. Thus every thing ſhows that the ſea flows in there, and continues to cover the land during a part of the year, probably at the time of the ſummer ſolſtice. The exhalation is very great in the plain of Peluſium, and half an hour after ſun-riſe all objects appear ſo much diſtorted that they cannot be diſtinguiſhed.*

Strabo informs us, that in his time Peluſium was 20 ſtadia in circumference, and ſtood at a like diſtance from the ſea.

In fact the whole length of wall that ſurrounds Peluſium is 20 ſtadia; but the ſea is now four times more diſtant than in the time of Strabo: ſo that if we draw a curved line at 60 ſtadia from Peluſium, to meet the moſt advanced point of the coaſt to the left of the mouth of the canal of Omm-Fareſdje, we ſhall have the extent of land

* This phenomenon was alſo remarked by the ancients. Quintus Curtius (lib. vii. c. 5.) ſays, that "In the deſerts of Sogdiana, the heat of the ſun in ſummer burns the ſand, and a fog which riſes from the heated entrails of the earth, obſcures the light, ſo that the fields appear like a vaſt extent of ſea."

Citizen Monge has inſerted in this collection a very well written memoir on this phenomenon, of which he has given an explanation.

by

formed by the ſand and earth depoſited on its right the lateral current which runs along the coaſt of the Mediterranean from weſt to eaſt. Thus the long canal of Omm-Faredje which is evidently of recent formation, will diſappear, and the iſland of Tennys will be brought two leagues nearer to the ſea, a ſituation which coincides better with that aſſigned to it by the ancients.

On the plain where Peluſium is ſituated are not the leaſt traces of vegetation. There is however, an inſulated knoll crowned with ſhrubs, and a few birds are the only gueſts that enliven the foliage or the deſert that ſurrounds it. But the aſtoniſhed Traveller perceives no other traces of an immenſe city and its vaſt population, than a few miſerable ruins and columns that lie buried in the earth. In vain may he ſearch for any traces or remains of a warrior who was long, happy, and ſucceſsful, but who at length was forced to yield to the better fortunes of Cæſar. No, he will find nothing but the ideal memory of that celebrated hero, who fell a victim to ingratitude by the baſeſt of aſſaſſinations.

A monument near the ſhore where Pompey landed would awaken innumerably intereſting reflections;

reflections;* it would alſo commemorate the æra when the deſcendants of thoſe Frenchmen who completed the deſtruction of Peluſium† recovering from an immortal ſtruggle againſt a coalition of all Europe; after having paſſed the Mediterranean and penetrated into Alexandria, came, after an interval of ſix centuries, not like fanatical knight-errants, but as warriors who are friends to mankind and to the arts, to ſignalize the other extremity of the baſis of Egypt, and the two routes that lead into Aſia and to India.—They have trod the burning ſoil of Nubia, and will ſeek to dignify their ſteps in theſe countries by a ſtill more honourable monument, the civilization of the nations of the Eaſt.

SECT. VIII.

Analyſis of the Conſtruction of the Charts of the Lake of Menzaleh.

IT remains that I give ſome account of the manner in which our chart has been conſtructed, and compare it with that of d'Anville.

* On ſuch a monument the following very ſimple inſcription might be engraved:—*Bonaparte to the Memory of Pompey.*

† The Cruſaders.

The

The vicinity of Damietta, and all that part of the peninſula compriſed between the canal of Kaſſab-el-Kache, the river Nile, the waters of the lake, as far as the Phatnitic mouth, and to the point of land to the weſt of the river on which ſtands the tower of Beughaz, were conſtructed by pacing *(au pas)* and by compaſs. The gulph of Minyeh, the iſland of that name, thoſe of Tal and Dorbetta, the poſition of Sheyk-Shata, and the bearing of Sheyk-el-Saby, were determined by means of baſes taken on the peninſula of Damietta.

Taking our departure from the Phatnitic mouth, oppoſite the ſquare tower, the bearing of the coaſt, the opening of the mouths, the directions and the breadth of their channels, compriſing the Peluſian mouth, were determined, with all poſſible exactneſs, by more than 130 interſections, the diſtances of which were meaſured with the chain. The breadth of the ſlip of land which ſeparates the ſea from the lake, was determined in the ſame manner.

The viſible points of the lake, ſuch as Sheyk-Bourdadi, Sheyk-Aboulefi, Sheyk-el-Saby, of which we had only taken the bearings near Damietta, were accurately determined.

The environs of Peluſium, the ruins of that town,

town, thoſe of Farama, and of Thineh, the line of the great downs which riſe towards Syria, the direction of the ancient Peluſian branch, and the coaſt of the lake in that part, were determined by the compaſs, and the diſtances meaſured with the chain.

All the part comprized between Matarieh and Menzaleh, Sheyk-Nabaleh, and the direction of the coaſt in that part, were determined by the compaſs and by pacing: and from thence we fixed, by means of baſes, the poſition of the iſland of Thouna, and of Sheyk-el-Saby.

Thus we had a ſeparate chart, which had the point of Sheyk-el-Saby in common with the firſt chart; and by determining this laſt point, the two charts were perfectly conſolidated. The iſland of Tennys was placed at the interſection of the viſual rays directed to that iſland, by Thouna and Sheyk-Nabaleh; the angle being very acute, we reconciled its poſition with the diſtance previouſly known by the traverſe.

The direction of the canal of Mo'ez, the poſition of San (Samnah), and of all the neighbouring places, the bearing of Salehieh, were determined by the compaſs; and the diſtances were eſtimated agreeably to the information furniſhed by the Sheyks of the country.

The

The following are the principal dimenſions of the lake of Menzaleh:

The diſtance from the anchoring place of Minyeh, near Damietta, to the arid plain which ſurrounds Peluſium, is 83,781 metres, or 43,000 fathoms.

This direction, which is at the ſame time the general direction of the coaſt along the lake, is W. N. W.

The diſtance from Matarieh, to the entrance of the canal of Debeh, is 22,377 metres, or 12,000 fathoms.

The diſtance from Matarieh, to the entrance of the canal of Omm-Faredje, is 50,269 metres, or 26,800 fathoms.

The firſt diſtance meaſured upon a line parallel to the coaſt, is the greateſt dimenſions of the lake.

Compariſon of the Chart with that of D'Anville.

In D'Anville's chart, there is no mention made of the two Matariehs which are the moſt conſiderable villages on the lake, on account of their poſition, and their numerous population; the poſition of Tennys is very near the truth; but the iſland of Thouna, which is on the weſt of

Tennys, is placed on the ſouth-eaſt of it. Beſides, the form of the lake is altogether different in D'Anville's chart. That geographer includes the baſon of the lake in the portion of a depreſſed arch ſubtended by the coaſt, or rather upon the ſlip of land which ſeparates the lake from the ſea, and to which he has aſſigned too great a breadth; at the ſame time, that in the chart lately conſtructed the contour of the lake is formed of two joining arches, the ends of which exactly meet.

If we now compare the windings of the coaſt in the two charts we ſhall find

	By d'Anville	Modern.	Difference. Excels.	Difference. Defect.
	Fathoms	Fathoms	Fathoms	Fathoms
From the ſquare Tower to the mouth of Dybeh . . .	17,850	15,723	2,127	
From the mouth of Dybeh to that of Tennys	16,320	22,120		5,800
From the Tanitic mouth to that of Peluſium	22,950	7,564	15,386	
Total of the windings of the coaſt excluſive of the breadth of the mouths. . .	57,120	45,407	11,713	

The

The total of the windings of the coaſt, including the breadth of the mouth, is 45,677 fathoms, or 89,087 metres.

I muſt not conclude without paying to my colleagues the tribute of praiſe which they merit, for the intelligence, zeal and activity with which they ſeconded my efforts*. They have additionally proved, that they knew how to reconcile exactneſs of operation, with the celerity which preſſing military diſpatch neceſſarily required.

The chart annexed to the memoir, although more exact than D'Anville's, would have been improved by including in its conſtruction the poſition aſtronomically determined by Citizen Nouet.

APPENDIX.

The following is nearly the population of the towns and villages adjoining Lake Menzaleh; I ſay *nearly*, becauſe, on account of the prejudice againſt an enumeration, nothing can be aſcertained on that head; and the information which we obtained was extremely vague.

* Citizens Favre, Potier, Bouchard, Tirlet, and Sabatier.

Leſbeh

Leſbeh - - - -	250	At Alhouet - - -	100
Eſbet et Keta - -	150	Aſſakaria - - - -	100
Eſbet inamora - -	150	Rahamyeh - - - -	150
Eſbet Karnounyeh -	200	Menzaleh - - -	8,000
Damietta - - -	18,000	Canton of Menzaleh -	500
Zenanieh - - - -	300	Naſſeimi - - - -	200
Minyeh - - - -	150	Obon et Lam - - -	100
Shouara - - - -	1,000	Matthariеh - - -	3,000
Kaſſab-el-Kache -	120	El-Malakaime - - -	80

Total - - 32,650 Inhabitants.

MEMOIR

MEMOIR,

On a Journey made, in the end of Frimaire, on the Tanitique Branch of the Nile.

By Citizen MALUS.

On the 25th of Frimaire, Citizen Fevre and I ſet out from Cairo, with a view to examine a ſuppoſed communication between the Nile and the Lake Menzaléh. The object of our journey was to aſcertain, whether or not that canal was navigable, at what time of the year it ceaſed to be ſo, and to make obſervations on the ſurrounding country.

In order to arrive at the object of our journey, we traverſed the whole extent of the province of Kelyoùbéh, which we found abounding in grain, paſturage, and woods of different kinds. The villages are large, the flocks numerous, and a degree of ſecurity reigns among the inhabitants, which we did not obſerve in the reſt of our journey.

We found the communication eaſy, till we proceeded a league beyong Kelyoub, where the country begins to be interſected by a number of trenches dug for the purpoſe of irrigation, but a free paſſage is procured at a ſmall expence. The

roads, although difficult, are agreeable. Moſt of them are bordered with rich gardens, producing trees and plants of different kinds, and others traverſe thick woods and immenſe nurſeries. The variety of the ſcene announces a kind of luxury in agriculture, which does not prevail in the other provinces through which we had paſſed.

On the third day of our journey, we reached the limits of the province of Kelyoûbéh, which terminates at Atryb. This little village is built at the extremity of the ruins of a city, which appears to have held a diſtinguiſhed rank. Theſe ruins are ſix hundred fathoms in length, and four hundred in breadth. The ſcite of a royal palace, of the principal ſtreet and of a public ſquare were pointed out to us. No trace of the palace can now be diſcovered: but the inhabitants affirm that, in digging the foundations of houſes, they find large blocks of marble. It may be preſumed, that they have converted thoſe blocks into lime, and that all the calcareous ſtones diſcovered in the remains of this city have been put to the ſame uſe; for ſuch appears to be the practice in all the towns in Egypt, and the remains of lime-kilns are ſtill viſible among the ruins of this. We alſo obſerved little ſubterraneous

terraneous vaults, similar to those in which the present inhabitants of Cairo deposit their dead, and these were probably intended for the same purpose. The traces of the great street are still very distinct, and form a right angle with the Nile, which washes the extremity of the ruins. Another less considerable street traverses the town, from south to north.

At the distance of a league from these ruins, stands the village of Mo'éz, and the beginning of the canal, which it was our intention to examine, and which bears its name for a part of its course. On the 27th Frimaire, when we arrived there, the Nile, at that distance from its mouth, was three hundred *metres* wide, and the canal fifty. A part of the waters of the river, directing their course towards the south-east, increased in rapidity in this new branch. At the first sight we suspected that this canal had not been dug by human hands, but that it was really a river; and succeeding observations verified our suspicion.

By accurate operations, we determined the situations and bearings of all the points in the vicinity of the origin of the canal, and from thence we began to construct the survey which was to accompany our memoir.

In the firſt ſix leagues we obſerved nothing remarkable. We conſtantly followed the courſe of the canal, and obſerved all its curvatures. The mean velocity of the current is about two hundred *metres* in a minute; and its depth throughout, exceeds five *metres*. The plain which it waters is fertile and well cultivated. It produces wheat, maiz, or Indian corn, and ſugar-canes, with ſome meadows interſperſed. It is watered by a great number of canals, in which the water is retained by dykes conſtructed on the banks of the great canal. Many of them, in the ſeaſon, when the waters are plentiful, may afford the means of communication with the interior country. Among the moſt conſiderable, is the canal of Fylfeti, half a league from the Nile; then, at the diſtance of ſix leagues and a half is that of Zamkalouch, which extends to the vicinity of Belbeïs. In the mouth of the firſt, there was at that time three feet water; that of the ſecond was elevated two feet above the level of the great canal.

At the height of Denyéh the canal is divided into two branches. We followed the eaſtern branch; the weſtern ſeparates into many ramifications, which join lower down, to that which we ſurveyed.

At

At the point where theſe two branches ſeparate, we ſaw the ruins of Thal Baſtah, or of the ancient Bubaſté, at a great diſtance. They are ſituated at the diſtance of ſeven leagues from the Nile, and half a league from the right bank of the canal. We there viewed many fragments of monuments which might illuſtrate the hiſtory of the Egyptian architecture. Among others, we obſerved a portion of a very maſſive corniſh, the ſculpture of which was in a ſtate of high preſervation. This fragment, which might be eight feet in length, and ſix in height, is compoſed of a very hard brown granite. The work upon it is highly finiſhed, and it is covered with hieroglyphics, of which we have given a drawing. Among the hieroglyphics, or other maſſes of granite, we found ſome characters which were wholly new to us. One ſide of an obeliſk, in particular, is wholly ſtudded over with ſtars, repreſenting the firmament. They have each five rays, two *centimetres* in length, and are joined in an irregular manner to each other. Enormous maſſes of granite, almoſt all mutilated, lie in aſtoniſhing heaps, and it is not eaſy to conceive what force could have broken and piled them on each other. Many of them have been made into mill-ſtones, ſome of which, compleatly cut,

have been left on the ſpot, doubtleſs from the want of means to convey them away.

This city, like all the other Egyptian cities, was raiſed on maſſive foundations of unburnt bricks. Theſe bricks are about a foot in length, eight inches in breadth, and as much in thickneſs, and are preciſely of the ſame material with that of the bricks now made in Egypt. The burnt bricks occaſionally found, are very different from thoſe uſed at the preſent day.

The extent of Bubaſté is about twelve or fourteen hundred *metres* each way. In the centre of it is an immenſe baſon, in the middle of which the monuments juſt deſcribed, are ſituated.

In this city, the feaſt of Diana, the principal one obſerved by the Egyptians, was annually celebrated. On that occaſion, the concourſe of ſtrangers, according to Herodotus, was not leſs than ſeven hundred thouſand, excluſive of children. This feaſt was a kind of orgy, which reſembled the Bacchanalia of the Greeks; and the ancients ſpeak with aſtoniſhment of the quantity of wine conſumed at it. In this city alſo were collected all the mummies of cats to be found in Egypt. That animal was held by the Egyptians, in almoſt as much reverence as the ibis; and they conveyed the mummies of the latter to Hermopolis,

Hermopolis, and thoſe of the former to Bubaſté. Before the town, is a large iſland formed by the branch of the canal which we have already mentioned. The ancient name of this iſland was Miecphoris. It formed a province inhabited by the Calaſiries, a tribe deſtined ſolely to the buſineſs of arms; at preſent it is a well cultivated plain, and contains great woods of palm-trees and ſome very rich villages; among others Guényéh, which gives its name to the weſtern branch of the canal.

At the diſtance of three leagues from Bubaſté, and upon the ſame ſide of the canal ſtands the little modern town of Heïhéh, which is very populous, and is ſurrounded with a thick foreſt of palm-trees. It is alſo encircled by a wall fifteen feet high, in very good repair, furniſhed with battlements and flanked by ſubſtantial towers with double parapets. The gates are in the form of *tambours*, which flank a part of the curtain. This little town appears to carry on a very conſiderable trade; and there were at that time under its walls, thirty large boats, laden with cotton, dates and grain.

From this town, to the loweſt extremity of the canal, we obſerved on both its banks, a great number of towers, conſtructed without either

doors or windows; but they are furniſhed with port-holes and battlements, and ſerve as places of refuge for the inhabitants, when ſurprized and purſued by the Arabs of the deſert.

Beyond Heïḥéh, in the midſt of a low ſwampy plain, ſtand the ruins of a town, which the inhabitants of the village of Orbet, founded upon them, told us, was Kourb. We found there the foot of a coloſſus, and the trunk of a ſtatue; alſo ſome pieces of columns and fragments of granite.

This town could not have been conſiderable, nor as we judged above a fourth part ſo large as Bubaſté. The inhabitants told us that it was founded by an European, long before the days of Mahomet. But this opinion of theirs is not probable; though it be alſo entertained by the inhabitants of the ruins of Atryb.

A league farther, on the oppoſite bank, ſtands a rich village called Kafr-Fournigheh, which is conſidered as the limit of the civilized country. The barks of the Nile never dare to deſcend below it; nor thoſe of the lower country to proceed above it. The villages which we viſited beyond that point, appeared much leſs opulent; and the land was more uncultivated, although the ſoil was equally good. The country is much thicker ſet with towers; every habitation is ſurrounded with

ſolid

ſolid walls, and each village has but one gate; and almoſt all the inhabitants go armed, even when employed in the labours of the field.

We found the canal narrower, after we paſſed Fournigheh, where its breadth is only about ſixty *metres*, its depth being ſtill the ſame. When it approaches the lake Menzaléh, into which it diſcharges its waters, the depth becomes about twelve feet. From El-Orbet, the country is interſected with a multitude of canals, ponds and marſhes, which render travelling difficult in the extreme. Many of theſe ponds retain their waters for ſix or eight months in the year. Oppoſite to El-Labaïdy, on the left bank, is a very large lake, extending to Aboù-dàout, which communicates by many openings with the canal, and which preſerves its waters for eight months, during part of which it is navigable. This lake, though ſeparated from that of Menzaléh only by a narrow ſtripe of land, has no communication with it.

Two leagues from the extremity of the canal, and on the right bank, we ſurveyed at different times, the ruins of San, or Tanis, which ſeveral perſons have already viſited. We found there only ſeven obeliſks, partly broken, a capital of a column, of the order ſince called Corinthian, and a monument

monument of granite, broken in two, which we preſumed to have been ſepulchral. We alſo met with ſome fragments of vaſes, compoſed of a very fine earth, and ſome of them coated with a varniſh, which is not yet decayed; to which we may add burnt bricks of different kinds, and bits of glaſs and cryſtal, extremely well poliſhed. Beyond this point, and as far as the lake Menzaléh, the plain is very low, and almoſt wholly inundated; and it is interſected with a multitude of canals, croſſing one another in all directions. Fronting San, there is a little canal leading to Salehyéh, which is navigable only for one month in the year.

Thus we reached the extremity of the canal; having aſſured ourſelves that it is navigable throughout its whole extent. After having collected this general information, we learned more particularly, that it was practicable for large *Jermes*, only for eight months in the year. After that period, it may, for ſome time, be navigated by little light boats; but this only in the lower part of the canal. For nine months of the year, the waters of the Nile flow freely towards the lake Menzaléh, and during the three laſt months, the waters of the lake flow back into the interior country. To provide againſt this inconvenience,

venience, a bank is yearly conſtructed, which laſts three months. But, notwithſtanding this precaution, the ſalt water ſtill flows back to the diſtance of ſeven or eight leagues; and oppoſite El-Labaïdy, where there is but a foot of water, it is entirely ſalt.

Such is nearly the ſum of the information, which we collected reſpecting this canal. From its breadth, its ſoundings, and the great number of ruins on its banks, we may almoſt conclude with certainty, that it flows in the channel of the ancient Tanitique branch of the Nile. To prove this, we need not repeat the obſervations which have been already made and communicated in another place.* We ſhall alſo wave any remarks on the junction of this branch with the lake of Menzaléh, and the means of communication between Damietta and Salehyéh, which the lower canal might afford. As to the communication with Cairo, we ſhall only obſerve, that it would be eaſier and more ſimple, to paſs directly to San by Mo'éz, than by the lake Menzaléh. By this means, the neceſſity of unloading at Damietta, land carriage to the lake, and re-loading on its banks, would be avoided, which would be a ſaving of time and expenſe. The

* See the Memoir on the Lake of Menzaléh, § 1.

reaſon

reaſon why ſo little advantage has hitherto been derived from this communication, is to be referred to the depredations by which it is continually infeſted, owing to the want of a public force to reſtrain the rapacity of individuals. Hence proceed hatred between the different villages, and a petty warfare, which hath put an end to all confidence.

When a ſyſtem of government and police ſhall be extended to thoſe parts, property becoming more ſecure, mutual confidence will be reſtored, commerce will reſume a new activity, immenſe tracts will be ſubjected to agriculture, the condition of the inhabitants will be improved, and riches and abundance will be diffuſed through that fertile country.

Particulars

Particulars concerning the Valley of the Natron Lakes, and that of the old Bed of the River, collected during an Excurſion thither on the 4th, 5th, 6th, 7th, and 8th of Pluvioſe, 7th Year.

By ANDREOSSI, *General of Artillery.*

THE only part of Egypt that Europeans in general are acquainted with, is the valley through which the Nile flows at preſent: there ſeems, however, good reaſon to believe from geological conſiderations, from the accounts of ancient hiſtorians, and of a few among the later travellers, that this river in ſome very remote period penetrated into the heart of the Lybian deſerts, where the traces of its courſe may ſtill be ſeen.

Herodotus affirms that the preſent baſon of the Nile was originally a reſervoir, conſtructed under the ancient kings of Egypt, a work of human ſkill and induſtry, probably the greateſt upon record.

It is from the inveſtigation of this primitive courſe of the Nile that we may expect to obtain the moſt correct ideas of the geology of Egypt, of the works that were undertaken to

enſure

enſure its fertility, and of the moſt effectual method to repair the diſorders which time, barbariſm, and ignorance, have produced in a country deſtitute of rain, and which, without the annual inundation and artificial waterings, would be condemned to perpetual barrenneſs. This ancient bed of the river is diſtinguiſhed among geographers by the appellation *Bahhar-bela-me* (*the dry river*) and is called by the natives of the country *Bahhar-el-farigh* (*empty river*). At no great diſtance are the lakes of Natron, the working of which, has been again reſumed within the laſt fifty years, on account of the increaſing value of their product in the various manufactories of Europe: in the ſame vicinity alſo were founded the convents of Coptic monks in the fourth century, a period when the active fanaticiſm of monaſtic inſtitutions crouded the deſerts of Thebais, with zealots and martyrs.

It was of importance to become acquainted with this part of Egypt, eſpecially on account of the advantages that might be hence derived to geology and the arts; for this reaſon citizens Berthollet, Fourier, and Redouté, jun. * were

* A ſkilful artiſt in deſigning plants, animals, &c. eſpecially fiſhes. Citizens Duchanoy and Regnault, the latter a pupil of Berthollet, were joined in the commiſſion.

deſired

desired to repair thither. A military force under my command accompanied them, for the purpose of protecting their researches in a district open to the incursions of the wandering Arabs; who, sometimes descending from Upper Egypt, and sometimes emerging from the deserts of Barbary, carry murder and devastation through the entire frontier. During the whole expedition, we carefully noted whatever appeared to us of any importance in our respective departments. I shall proceed to relate the particulars of our journey, leaving it to citizen Berthollet to present the results of his interesting experiments on the analysis of the Natron.

SECT. I.

CONCERNING THE VALLEY OF THE LAKES OF NATRON.

We set out from Terraneh on the 4th Pluviose at two in the morning, and, after a journey of fourteen hours, came within sight of the valley in which the Natron lakes are situated.

TOPOGRAPHY.

An extensive plain, about thirty miles across, divides the valley of the Nile from that of these lakes:

lakes: the ſurface of the plain, gently waved, and conſtantly parallel to the ſea, is throughout nearly on the ſame level; the ſoil firm and ſolid, is compoſed of gravel and rounded pebbles, conſiſting of flint of various colours, and agate. The weſt winds which blow here with great violence, have driven almoſt the whole of the looſe ſand acroſs the hills which border the Nile, into the valley. The calcareous rock riſing to the ſurface, here and there diverſifies the view; all the reſt is unvaried deſert inacceſſible to vegetation, except to a few ſcattered ſhrivelled ſpecimens of *nitraria* and *hyoſcyamus*.

The impoſſibility of almoſt any animal ſubſiſting on ſo arid a ſoil, was doubtleſs the reaſon of our ſeeing there only a few individuals of a ſingle ſpecies of inſect, the *mantis obſcura*, whoſe name is emphatically expreſſive of the deep ſolitude in which it lives in the midſt of this ſpacious deſert.

The direction of our march from Terranéh was firſt from eaſt to weſt; but about two hours before our arrival at the valley of Natron, after having paſſed a low hillock called *Ras-el-Baharah (the cow's head)* our route changed to nearly north-weſt by weſt. We halted by the ſide of a *kaſſr*, or ruined fort, ſituated on a gentle riſe; the

ſquare

ſquare encloſure and round towers which flanked two of its angles are built of blocks of natron, a ſufficient proof of the infrequency of rain in this diſtrict. A little below, in the bottom of the valley, are ſeen the lakes of Natron; in front, at ſome diſtance, on the oppoſite aſcent of the valley is the convent of the Greeks or *El-Baramous*; and on the left appear the neighbouring monaſteries of the Syrians and of *Amba-Bicoi*.

We included in a triangle the convents of the Syrians and of *El-Baramous*, and the ruined fort, meaſuring the diſtance between the two laſt to ſerve for a baſe: the length of this was 7231⅛ metres; the diſtance, as found by calculation, between the fort and the convent of the Syrians was equal to 7430⅜ metres, and that between the laſt mentioned place and *El-Baramous*, was equal to 9258¼ metres. The road from the fort to either of the other places lies acroſs a tract of ſand in ſome parts looſe, in others firm and covered with ſaline efflorescences: a few plants are ſeen here and there; banks of gypſum and limeſtone are met with through the whole diſtrict, and there is a ridge of excellent chalk between the two convents of the Syrians and the Greeks.

NATURAL GEOGRAPHY OF THE VALLEY.

The valley of Natron makes an angle of about 44 degrees weſt of the magnetic meridian; the lakes alſo lie in the ſame direction in the valley with regard to their relative poſition and their longeſt diameter. In the map of Father Sicard only one large lake is laid down at right angles to the direction of the valley; thus not only committing a local error, but in direct contradiction to hydrography in general. There are, in fact, ſix lakes, three to the north of Kaſſr, and three to the ſouth. The inhabitants of Terranéh indeed, reckon ſeven; the lake (No. 4.) having been formerly divided by a dyke, which is at preſent broken through. Danville, on the authority of Strabo, makes two lakes, but in the ſame direction as Father Sicard's.

The lakes compriſe a ſurface about ſix leagues in length, by ſix or eight hundred metres in breadth, from one ſide of the valley to the oppoſite; they are ſeparated from each other by banks of dry ſand. The two ſouthernmoſt are called *Birket-al-Deouara* (the lakes of the Monaſteries), the remaining four have no particular appellation.

appellation. The Sammalou Arabs* carry on a contraband traffic with Alexandria in natron, which they procure from the northern lake (No. 6.)

Drinkable water, though brackiſh, is found along the lakes on the ſide neareſt the Nile; theſe ſprings are very abundant during three months in the year, from the beginning of Pluvioſe; they then begin to fail, and ſome of the lakes are entirely dried up.

It is of importance to notice the natural ſtate of theſe lakes. Their ſides are hollowed out into ſmall creeks, from the top of which the water flows, as is cuſtomary at the heads of valleys: each of theſe is occupied by a rivulet that diſcharges itſelf into one of the lakes; the ground above theſe ſprings in the lake (No. 3.), which we particularly examined, for an extent of about two hundred and fifty metres, is covered with ſaline cryſtals, among which grows, in conſiderable quantity, that kind of compreſſed ruſh, of

* The Sammalou as well as the Djeouaby Arabs, of whom we ſhall have occaſion to ſpeak hereafter, are a tribe of hoſpitable ſhepherds. They are governed by three chiefs, the principal of whom is Scheik Soliman-Abou-Demen. Their force amounts to about one thouſand men and forty horſes.

which the common mats of the country are made. The ſprings themſelves occupy a tract about ninety-eight metres broad, and a band of natron thirty-one metres wide encompaſſes the edge of the lake. The dimenſions of the lake itſelf are 514 by 109 metres; its greateſt depth is half a metre; the bottom is chalk mixed with ſand. The colour of the water in this ſingle lake is almoſt that of blood.

The above is the ſtate of the lake (No. 8.), on the ſide neareſt the Nile. The oppoſite ſhore is mere ſand, deſtitute of ſprings, and almoſt of vegetation. Whence originate the ſprings that feed theſe lakes? Do they come from the Nile by a ſlow filtration through the maſs of deſert thirty miles broad that ſeparates the two valleys, following the general declivity of the country to the north-weſt; or do they riſe at the head of the valley in the province of Faïoum, where it probably unites with that of the Nile? The ſecond opinion, though the moſt natural, ſeems to be rendered inadmiſſible by the ſituation of the ſtreams, which all originate from the eaſtern ſide of the valley: there are, indeed, a few ſprings on the oppoſite ſide, but very deep ſeated. A further confirmation of this opinion is, that the

riſe

riſe and fall of the waters of the lake regularly happen within a ſhort time after the annual inundation of the Nile.

ANALYSIS OF THE WATERS OF THE LAKES.

The waters of the ſeveral lakes contain ſeveral ſalts, which differ in proportion, even in parts of the ſame lake, that have little communication with each other. Theſe ſalts are always muriat of ſoda, carbonat of ſoda, and a ſmall quantity of ſulphat of ſoda: in ſome parts the carbonat of ſoda predominates, in others the muriat of ſoda.

It appears from the nature of the ſoil that the carbonat of ſoda is carried into the lakes by the water of the fountains which we have ſpoken of, or waſhed down by the rains; and this explains why the proportion of ſalt varies ſo much in different parts.

The waters of one part of the lake (No. 3.), and thoſe of the lake (No. 4.), are tinged red by a vegeto-animal ſubſtance. On evaporating theſe waters, the marine ſalt, which cryſtallizes the firſt, retains this red hue, and at the ſame time acquires an agreeable ſmell, like that of the roſe.

Citizen Berthollet is of opinion that the pro-

duction of the ſoda is owing to the decompoſition of the ſea ſalt by means of the carbonat of lime which is found every where in the moiſt ſoil in which theſe changes take place. The preſence of moiſture is abſolutely neceſſary to the decompoſition of marine ſalt, and this has always been found in theſe circumſtances. As to calcareous earth, it abounds every where between the Nile and theſe lakes, as well as in the valley, where it appears as lime-ſtone rock or in the form of chalk.

MANNER OF PROCURING THE NATRON.

The working the ſalt lakes is one of the employments of the inhabitants of the Terranéh,* a canton which is included in the new boundaries of the province of Djyzeb.† The natron is only carried

* The canton of Terranéh contains ſix villages: Aboryat, Kaſſr-Dâoud, Terranéh, Lagmat, Natagbe, and Abouniehabé.

† Under the dominion of the Beys the province of Djyzeb was bounded to the north by the Djeſr-el-Ecoued, or the Black Dyke, which ſeparated it from the province of Bahyreh. At preſent it extends as far as the village of Aboulgraoué. The Djeſr-el-Ecoued croſſes the plain from the ſandy levels whence it begins, as far as the Nile. The extremity of this dyke, near the village of Omm-dynar is furniſhed with flood-gates to let off the waters brought by the

carried during the interval between ſeed-time and harveſt.

The caravans aſſemble for this purpoſe at Terranéh. Each caravan is uſually compoſed of a hundred and fifty camels, and five or ſix hundred aſſes. It ſets out with its eſcort at ſun-ſet, arrives on the ſpot in the courſe of the next day, breaks up the natron and takes its lading, and returns without delay. On its way back the caravan halts at mid-day, and fires are made of the dung of the aſſes and camels of a former party.* The guards belonging to the eſcort and the drivers then drink their coffee, ſmoke their pipes, and make a few cakes with flour and water mixed on a wooden trencher, and afterwards baked over the fire. The captain of the troop then places ſentinels for fear of a ſurprize from the Arabs, and the reſt of the caravan ſleep for ſome hours; they then reſume their journey, and by the morning of the third day they are returned to Terranéh.

the inundations of the Nile. Theſe waters are kept in as long as is requiſite, by the Djzeſr-el-Ecoued, and thus render the plain highly fertile and productive.

* The great ſcarcity of fuel renders it on this account expedient for one caravan always to halt in the ſpot occupied by the laſt.

Every caravan is reckoned to convey ſix hundred kanthars of natron of forty-eight okahs each.*

The natron is ſtored at Terraneh, and is ſhipped from hence to Roſetta, thence to Alexandria, and from this port to Europe; or elſe it is ſent up to Cairo and there diſpoſed of for the uſe of the linen bleachers or the glaſs makers. It is reckoned to loſe a tenth of its weight by waſte and drying during the carriage.

The Fellâhs of the ſix villages of Terraneh pay their *myry* in cargoes of natron.

When from the preſence of the Arabs, or any other impediment, the Fellâhs are prevented from fetching the natron, the duty is commuted for eleven parahs† upon each kanthar of this ſalt which they were required to furniſh.

* Another ſpecies of natron is to be met with at Cairo, brought thither by the Gelab negroes from Arfour and Sennar, which is employed in the preparation of the Egyptian tobacco as a ſeaſoning. Citizen Reynault has analyzed this ſalt, and finds that it contains a greater proportion of muriat of ſoda than the ſpecimens which have already been mentioned.

The okah weighs 400 drahms or 2¾ French pounds, equal to 2 pounds 5 ounces 1-20th of an ounce Engliſh avoirdupois weight.

† Twenty ſous of France (about ten Engliſh pence), are equivalent to twenty-eight parahs.

The

The natron is ſold in Egypt for one patah of ninety parahs for the kanthar of thirty-ſix okahs, the buyer paying the carriage by water. The collector who farms this duty furniſhes powder and ball for the caravan, and pays the eſcort conſiſting of ſixty armed men, called *baſciat*, who all receive equal wages.

The farming of the natron was preciſely a *gabelle*. The villages that poſſeſſed manufactories that uſed this article were obliged to purchaſe, annually, a certain quantity of this ſalt from the principal agent.

The difficulty of penetrating into the natron valley ſtood much in the way of any opportunity of obſerving the lakes, ſo that they were not examined with any kind of regularity. The borders of the ſeveral lakes are covered, as we have already mentioned, with cryſtalline maſſes of ſalt, which, however, are not touched, though they might yield a great profit, as they are in immenſe quantity. At preſent there is only the lake (No. 4.) which is worked. The men go naked in the water, and break or tear off the lumps of natron with a ſort of round iron mattock of ſixty pounds weight, with a head blunt on one ſide and coming to a ſharp point on the other. They take no pains, however, to collect only

only the ſurface of the maſs which might be gathered with much more eaſe than the other part. It makes an odd ſpectacle to ſee theſe black or tawny Egyptians coming out of the water quite powdered with the ſalt.

TRADE OF THE NATRON.

To eſtabliſh this article of commerce on a right footing would require a proper analyſis of the ſalt, which the inhabitants are not equal to; and a degree of activity and attention which is not practiſed in a country where the honeſt gains of induſtry are expoſed to be a prey to the rapacity of the governors. The natron has been ſuffered to remain adulterated with different ſalts, eſpecially ſea ſalt, whence aroſe an encreaſe of weight which enhanced the price of carriage. On the other hand, the manufacturers of Marſeilles complained of the ſerious loſſes which they experienced in the wear of the veſſels in which this impure natron was boiled. They began to look toward the ſoda of Alicant, and Egypt was about to loſe this market in Europe, when the war broke out and rendered all foreign communication more difficult.

It was in the years 1788, 89, and 90 that the merchants of Marſeilles, giving unbounded ſcope

to

to a new ſpeculation, imported into France a vaſt quantity of natron, a part of which ſtill remains in their warehouſes.

The export trade of this article from Egypt to foreign countries has been confined to Venice, France, and England. The demand for France and England was nearly the ſame. Venice only took a fifth part of the quantity conſumed by the other countries.

Citizen Reynault is at preſent employed on a very important object to this article, that of ſeparating in the great way the ſoda contained in the natron, ſo as to be able to offer it for ſale in a ſtate of perfect purity; which will add but little to the general coſt of working this ſalt, and double the value of the product. In certain kinds of natron the ſea ſalt is found lying between two horizontal beds of ſoda, and here, therefore, it may be ſeparated by mere mechanical means.

The trade of Egypt in natron when a colony of France will, therefore, depend eſſentially on theſe two conſiderations: firſt, in a free and unmoleſted working of the ſalt lakes, which will be obtained by proper eſcorts and military poſts, ſuch as reſtoring that of Kaſſr, and the coptic convents, by which means the Arabs will be better known, and therefore leſs dreaded; and ſecondly,

ſecondly, by a proper ſelection and purification of the natron, eſtabliſhments for which ſhould be made in the neareſt inhabited places, and the lakes, ſuch as at Kaſſr or Terranéh.

NATURAL PRODUCTIONS IN THE SALT VALLEY.

On the banks of the natron lakes grow a great abundance of flat ſtemmed reeds, and other productions of the vegetable kingdom, and the vivid green of theſe plants forms a ſtriking contraſt with the dazzling white of the maſſes of ſalt, and the grey duſky gravel of the deſert.

Near the lakes are found the following plants: the *arundo maxima*, Fors. the *ſtatice aphilla*, Fors. the *tamariſcus gallica*, Fors. the *artemiſia maxima*, Linn. the *juncus ſpinoſus*, Linn. and the *typha latifolia*, Linn. This European plant, which grows in ponds in France, is one of the moſt plentiful of all thoſe on the banks of the natron lakes. There is alſo found the *lithoſpermum anguſtifolium*, Linn. the *zygophyllum album*, Linn. the *fagonia ſcabra*, Fors. and the *ſueda vera*, Fors. a ſpecies of ſoda ſo called from the Arabian name *ſouked*. A few ſtunted palm trees may be ſeen forming thick buſhes, but which bear no fruit.

We

We alſo meet with twenty or thirty palm trees beyond the laſt of the lakes, lying in a confuſed heap out of the ground, as if they had been torn up by the roots by ſome violent convulſion of the earth.

As to animals, we found but few of them. Among the inſects we remarked the *pirnelia muricata*, the *carabus variegatus*, the common ant, a large kind of winged ant, and a ſpecies of moſkitto, the bite of which occaſions conſiderable ſwelling. Among the teſtacea we found one of the ſmaller ſnails. The quadrupeds that we noted were cameleons and the gazelles: theſe laſt may be traced by the mark of their ſmall cloven feet which they leave on the ſand. Among the birds we remarked the water hen, the duck, and the teal; theſe birds are in vaſt numbers, eſpecially in the fartheſt lake, which is the leaſt frequented.

No traces of ancient monuments are to be found in the valley of the natron lakes. We only ſaw below the fourth lake the ſite of a glaſs houſe, which we made out by the remains of the furnace, bricks, and fragments of ſcoria of glaſs in different ſtates. The ſpot was certainly well ſituated for an abundant ſupply of the two materials for glaſs, vitrifiable ſand and ſoda; and

perhaps

perhaps at that time wood was not ſo ſcarce in the valley as it is at preſent. We cannot fix the date of this eſtabliſhment. A ſmall medal or piece of coin which we picked up might have given us ſome information on this head, but it was ſo eaten up by ruſt that we could make out nothing from it.

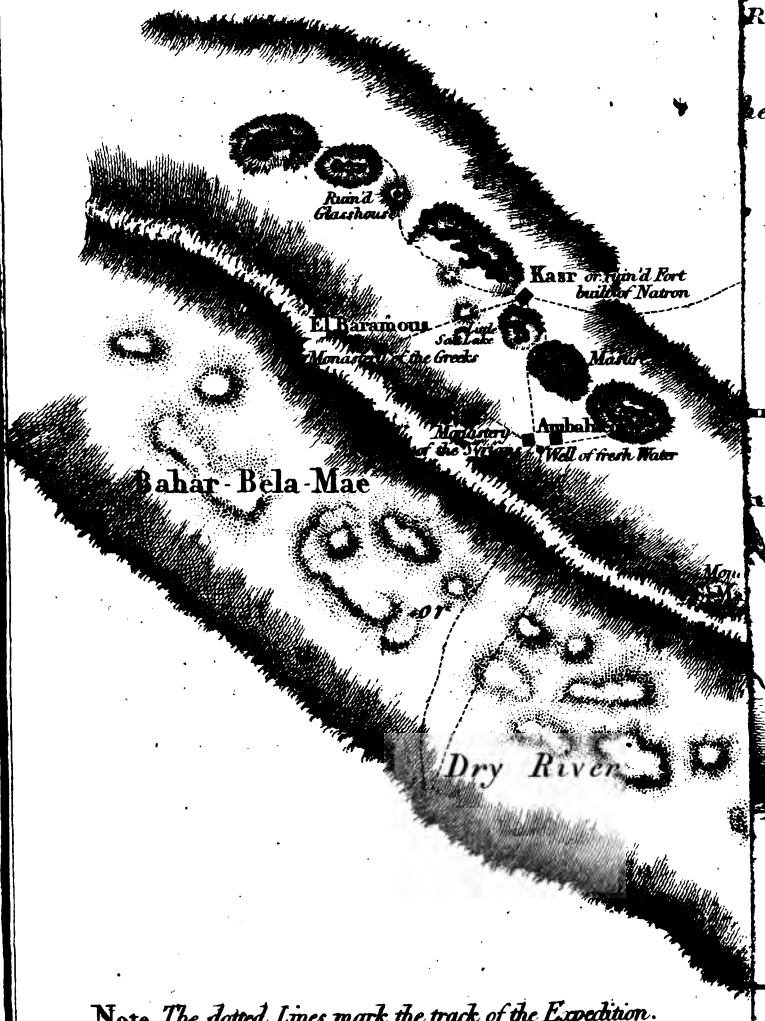
SECT. II.

TOPOGRAPHY OF THE DRY RIVER.

THE valley of this river lies to the weſt of that of the natron lakes, they are contiguous, and only ſeparated by a chalk bed. It takes an hour and a half to travel from the convent to the adjoining valley.

The valley of the river without water is blocked up with ſand beds, and its extent in length from one end to the other is nearly three leagues: It requires forty minutes to deſcend by a regular ſlope into the heart of the valley above the ſands. This valley is barren, and appears to contain no ſprings. We found much petrified wood, ſome of it entire trees eighteen paces in length. The timber of the trees, and the fragments ſcattered about, did not appear to have been

Expedition of Bonaparte in Egypt An 7. 8.



Note *The dotted Lines mark the track of the Expedition.*

Scale of Toises & of Leagues comprising 2500 Toises

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been put to any uſe *. The greater number of theſe pieces of wood appear agatized, others ſeemed to be leſs advanced in their cryſtallization, and at this period they are envelloped with a very thick hard cruſt, whilſt that which formed the ſubſtance of the wood drops off in ſcales. We likewiſe found in this baſon the vertebræ of a large fiſh, which appeared to be mineralized, and what makes this opinion probable, we ſhall find further on, that water did flow through the valley, and contained living animals.

Beſides the petrified wood there is to be found, chiefly on the ſlopes of the valley, round maſſes of quartz, which muſt certainly come from a great diſtance, ſilex and ſiliceous ſtones, gypſum, quartzeous cryſtallizations formed in cavities of ſtones, ſome kinds of geode, rounded fragments

* Father Sicard, in his *Lettres Edifiantes*, aſſures the reader, that in the valley of the river without water are found entire maſts and wrecks of ſhips petrified. We ſaw nothing of the kind where we were, which indeed was only in a part of the valley.

Granger, in his travels in Egypt, aſſerts, that what is generally taken for petrified wood is not ſo in fact. The ſpecimens which we brought back with us have ſo much of the character of petrified wood, that they appeared as ſuch even to unpractiſed eyes; and good naturaliſts who have examined them are of the ſame opinion.

of

of jaſper, fragments of rock containing green petroſibe, thoſe jaſpers called Egyptian pebbles, &c. The greater part of theſe belong to the primitive mountains of Upper Egypt; they therefore muſt have been brought hither by the waters of the Nile. Hence there muſt formerly have been a communication between the Nile and the Bahhar-bela-me, and conſequently between theſe two vallies. There is beſides no reaſon why this communication ſhould no longer exiſt, and we ſhall make out the probability of this from other conſiderations.

The direction of the valley of the dry river is the ſame as that of the natron lakes. The general opinion is, that in tracing up theſe vallies you arrive at Faïoum, and in following their courſe downwards, you leave the province of Maryouth on the right *. This is the way which the wandering

* Maryouth is four leagues weſt of Alexandria, near the ſea coaſt. A detachment of light troops on dromedaries may reach this town in two hours and a half. There are found here three deep wells well kept up and ſupplied by rain water. Some ruins are found in the neighbourhood, and tombs of the Arabs adorned with amulets. (There are verſes of the Koran written on little ſlips of leather hung by threads around the tombs.) The territory of Maryouth joins the hills that terminate the chain of Lybian mountains.

dering Arabs generally follow when they make their incurſions into Upper Egypt.

From the direction of theſe vallies it is to be preſumed that their origin is at the ſpot where the lake Mœris is laid down, and their extremity at the Arabian Gulph.

The magnitude of the valley of the dry river, its direction, and the accounts which hiſtorians give of the lake Mœris*, would lead us to believe that this reſervoir was only the head of this valley

mountains. The ground is covered with an alluvial ſoil like that of Egypt; and hence it has derived its origin from the waters of the Nile, which formerly muſt have flowed over this ſpot. During the rains ſome herbage ſprings up, and it is then viſited by the Arabs, chiefly the Djeouabys, and their flocks and herds. The wells being only kept up by the rains, fill very ſlowly in dry weather.

Maryouth is frequented by the Arabs on account of its neighbourhood to Alexandria, and becauſe this ſpot is the laſt of the chain of wells that border the deſert aſcending to the province of Bahyreh. This chain paſſes through Zarufit Ellauche, Dereké, Cabr-el-mara, Ellahouie, &c. and joins to the natron lakes by Ellauche. By travelling along the raiſed flat which ſeparates the two vallies, a day's journey will bring you from Ellauche to the northern extremity of the lakes cloſe to two adjoining hillocks, which are called the Two Paps.

* The ſurvey of this country, which circumſtances would not permit us to make, would be the true key to the geology of Egypt.

which had been dammed up by the ſands either naturally or by manual labour, ſo that this lake was probably only formed and not dug out. This opinion is the more probable, as an inſpection of the topography of the country will make it obvious that a reſervoir dug below the level of the ſoil of Egypt would render its ſupply of water uſeleſs to the ſoil; and we have already ſhewn that this water thus retained would be more diſpoſed to flow towards Bahhar-bela-me than within the interior of the valley of the Nile. To render ſuch a reſervoir uſeful to the lower part of Egypt, it would, on the contrary, be neceſſary for the lake to be formed by dykes, ſo as to keep above the natural ſoil, that after the inundation it might overlook the ſoil of Egypt. The exiſtence of the lake Mœris therefore, and the object uſually attributed to it, becomes very dubious, and will perhaps always remain problematical.

If we might hazard an opinion it would be that the earlieſt and gradual opening of the boſom of the Nile in Faïoum are only owing to the opening of Bahhar-bela-me, which takes an oblique direction. Father Sicard, and after him D'Anville, lay down the channel of this ancient branch in the direction of the lake Mœris, but leave uncertain their point of contact. Beſides, they

they make the dimenſions of this lake much too large when compared to the extent of Bahhar-bela-me. If the opinion which we have given be ſaid to be only a conjecture, it appears at leaſt to be a fair inference, from the knowledge which we have actually obtained, that there have exiſted large channels of rivers in the interior of the deſerts, and that it is highly probable that the Nile ſeparated into ſeveral branches as high up as the lake Mœris; and eſpecially that a branch, as we obſerved before, flowed within the baſon along the hills of Lybia, as is confirmed by the teſtimony of authors, and by the remains of a conſiderable hollow or depreſſion which follows the direction of the hills, and would only have been produced by a large current of water. This hollow I found again, and traced it along the whole extent of the province of Djyzreh for the ſpace of thirty leagues. Higher up its courſe it ſeems to incline more forward, perhaps as far as the origin of the canal of Youſef, that is to ſay, to that point where it is probable that the Nile has been turned in order to be carried along the right bank, at the bottom of which valley flow the waters of the Bahhar Youſef*.

* This canal, which in the province of Djyzeh bears at firſt the name of El-lebene, then Elaſſera, reſumes in the

Thus from the teſtimony of geology, which is imprinted on the ſoil of Egypt, it appears:

1ſt. That the Nile, or more probably only a part of the waters of this river, flowed in the interior of the deſerts of Lybia along the vallies of the natron lakes and the dry river.

2d. That the waters were turned aſide in the actual valley of the river; and this perhaps is the occaſion why, in the time of Herodotus, the waters during the inundation roſe to fifteen cubits, whilſt in the time of Maris they only reached eight cubits, and why in our time they only riſe as high as eighteen cubits.

3d. That the Nile after this change flowed entire along the hills of Lybia, and formed the hollow which is ſeen in Lower Egypt and part of Middle Egypt.

4th. That the Nile was thrown back upon the right ſhore, and this period immediately preceded the regular diſpoſition of the ſeven branches of the Nile and the formation of the Delta. (See the memoir concerning the lake Menzaléh).

5th. The geological teſtimonies which bear proof to the preceding facts likewiſe confirm

province of Bahyreh the appellation of Bahhar-Youſef, the ſame that it bears in Upper Egypt.

What

what we have ſaid in the ſame memoir, that the waters of the Nile have a tendency to bear to the weſt, which bearing is marked in Egypt, as it would be for any point in other countries, by the general topography of the ſoil.

It follows from this laſt circumſtance that the project of Albuquerque to ruin the fertility of Egypt, by turning the courſe of the Nile, would be more practicable by making a canal from this river into the deſerts of Lybia than into the Red Sea, as was intended.

The valley of the dry river is not the furtheſt point of the interior of Africa that is viſited in this direction. The inhabitants of Terranéh go beyond this valley to cut a particular ſort of ruſhes which are uſed in making the fineſt mats. The Djeouaby Arabs are employed in carrying theſe ruſhes to Menouf*, where they are ſold. In

* Menouf is ſituated on the Delta, near Terranéh, two leagues from the branch of the Delta, and four from that of Damietta, on the eaſtern ſide of the canal of Faraounyeh, which croſſes obliquely the ſouth part of the Delta. This canal on the ſide of Damietta is cloſed by the dyke of Faraouyneh.

It is by means of this dyke and canal that an enlightened adminiſtration might effect a juſt partition of water between the eaſtern and weſtern provinces of the Delta. Thus

In order to reach the place beyond the valley of the dry river, where theſe ruſhes are procured, it is neceſſary to make three long day's journies acroſs a tract entirely deſtitute of water.

PROGRESS OF THE SANDS.

It has been already mentioned that the valley of the dry river was much encumbered with ſand, which, as well as what is found in the valley of the Nile, appears to have been brought hither by the violent winds which blow over the elevated plains ſituated to the weſtward. The valley of natron and that of the dry river being ſeparated from each other by a mere ridge, the former has been ſcarcely at all incommoded by the ſhifting ſands, although its eaſtern boundary is the high deſert that lies between this valley and the Nile. This clearly proves the progreſs of the ſands to be from weſt to eaſt, and their actual advance in this direction for many years has induced very ſerious apprehenſions on ac-

might the diſorders of the former tyranny be in ſome degree repaired, which, by favouring the provinces of Manſoureh and Damietta at the expence of Bahyreh, have reduced this laſt for want of water, in great meaſure into a mere deſert.

count

count of the left bank of the river, which is by far the moſt fertile part of Egypt.

Not to wander beyond the limits of the map, we may begin by obſerving that the ſand hills on which Beniſelamé is ſituated, and which encloſe Atris and Ouardan, are drifted up by the weſt winds from the deſerts of Lybia. The alluvial ſoil formed from the depoſitions of the Nile ſerves them for a baſe, which accounts for the beautiful ſycamores previouſly rooted in this ſoil, which are found diſperſed through the whole of theſe arid downs. The ſands here and in other parts are blown on the bank of the Nile, juſt as the aſhes from Veſuvius are on the ſea ſhore; the road by the river ſide is obſtructed by them to ſuch a degree, as to induce moſt travellers at preſent to deſert it. The above facts, and thoſe mentioned in the memoir concerning the lake Menzaléh, lead to the following conſiderations.

There ſeem to be three cauſes which, by their union for many years, have impaired the proſperity and contracted the fertile territory of Egypt. A turbulent adminiſtration, active only in miſchief; the diminiſhed action of the Nile, in conſequence of neglect, which has again yielded to the encroachments of the ſea much of the newly formed land of Lower Egypt; and the unintermitted action of

the wind, which has driven the ſand from the weſtern deſerts on the cultivable land, and into the river and canals. The two firſt cauſes may in part, at leaſt, be removed, but no human effort can raiſe a barrier to the progreſs of the ſands. In this deficiency of natural means, ignorance and credulity have invoked the aid of ſuperſtition; and accordingly we read in the Arabian authors,* that the ſphinx near the great pyramids is a taliſman to arreſt the progreſs of the ſands of Lybia, and prevent them from entering the province of Djyzeh.

From what has been mentioned before, however, it ſeems probable that this invaſion by the Lybian ſands is near its termination, at leaſt in Lower Egypt; and, in fact, there are few moving ſands on the plain to the weſt of the Nile.

This plain is calcareous rock, whereas almoſt the whole of the ſand in the valley of the Nile is quartz: for the future, therefore, no ſand can be drifted from this tract except ſuch as proceeds from the decompoſition of the calcareous rock. The ſands from the interior of Africa, in their progreſs towards the Nile, are effectually ſtopped by the valley of the dry river, which includes

* See the geography of Abdul-thachyd, who wrote about the year 1403.

the

the provinces of Djyzeh, and Bahyreh. It is true this valley is already much encumbered, but many years muſt elapſe before it is quite filled up; and even when this event takes place, the valley of the natron lakes oppoſes a barrier, which muſt be in the ſame manner overcome, before any ſand can reach the plain weſt of the Nile.

The action of the winds on the ſands which are in the valley of the Nile itſelf, is, without queſtion, the moſt formidable. Theſe are in almoſt perpetual motion, and by degrees will probably reach to the very brink of the river, as is already the caſe in the narroweſt parts of the valley. The river too, accelerates the evil by the conſtant wearing away of the weſtern bank, thus of itſelf approaching the ſands, and at the ſame time eroding the moſt fertile part of Egypt.

SECT. III.

CONCERNING THE COPTIC MONASTERIES.

THE Coptic monks were eſtabliſhed in the valley of natron in the fourth century; but the monaſteries themſelves have been ſeveral times rebuilt ſince that period. Three of theſe are in the

the form of a long ſquare, the dimenſions of which are from 98 to 142 metres in one direction, and from 58 to 68 metres in the other, giving a medium ſurface of about 7560 ſquare metres.

The walls by which they are ſurrounded are, at leaſt, thirteen metres in height, and from two and a half to three metres thick at the baſe. In the upper part of the wall is a platform about a metre in breadth, above which are loop holes in the wall itſelf, and ſmall baſtions to enable the inhabitants to keep off the Arabs by throwing ſtones, for the inſtitutions of theſe monks do not allow them to make uſe of fire-arms. The baſtions are maſked to protect the garriſon from muſketry.

The monaſteries have only a ſingle entrance, which is low and narrow, not exceeding one metre in height, and two-thirds of a metre in width. This is cloſed by a very thick door, faſtened by a lock at the top, by a ſtrong wooden bolt about the middle, and a little lower, by a bar bedded in the wall. The door is further ſtrengthened, on the inſide, by a covering of broad iron plates. On the outſide the entrance is, as it were, hermetically ſealed by two blocks of granite, placed upright, and by the ſide of each other.

other. The diameter of theſe blocks is rather leſs than the height of the entrance, and their thickneſs ſuch as to allow them to lie ſide by ſide within the door poſts. The door is alſo defended by a kind of portcullis. When they want to cloſe up the entrance, a monk begins by rolling one of the blocks of ſtone into its place, he then ſlides into the gateway, and pulls towards him the other block, and places it by the ſide of the firſt; this kind of outwork being thus arranged, he cloſes the door. The uſe of the portcullis is to expoſe any who may attempt to remove the ſtones.

The bell of the monaſtery is fixed by the ſide of the portcullis. A long rope made of the filaments of the date tree, hangs from it almoſt to the ground. It ſometimes happens that the monks are rouſed, during the night, by the ſound of the bell; but always diſtruſting, even when they recognize, from the top of the wall, their friends below, they never open the door to them, till a monk, deſcending by means of a rope to the portcullis, examines them face to face, and is convinced that no ſurpriſe is intended. While the door is opening a monk remains ſentinel on the top of the wall, to obſerve whether any Arabs appear in ſight.

Within

Within each monaſtery is a ſquare tower, acceſſible only by a drawbridge five metres long, and about ſix and a half above the ſurface of the ground. This bridge is raiſed by means of a cord or chain, which paſſes through the wall, and is wound round a horizontal windlaſs within the tower. The top is a platform higher than the boundary wall.

The three monaſteries in the neighbourhood of the lakes have wells thirteen metres deep, containing about one metre of freſh water, which is raiſed by a wheel and bucket. Theſe wells ſupply the wants of the monks, and are ſufficient to water a little garden in each monaſtery, in which are cultivated a few legumes; and where grow the date tree, the olive, the tamarind, the hennè, and the ſycamore. By the beginning of Pluvioſe the water of the wells is at its *maximum* of elevation; it ſinks in ſummer, but the ſprings are never entirely dry. The monaſtery of the Syrians poſſeſſes the miraculous tree of St. Ephrem,* which is about ſix metres and a half high,

* It is related that in the early age of monaſtic fervor, the monks of the deſert, already diſguſted with their ſituation, complained of the total want of vegetation in their ſandy ſolitude. St. Ephrem, to prove and enliven their zeal, ordered one of his proſelytes to plant his ſtaff in the ſand, aſſuring

high, and three in girth: it is an Indian tamarind, (*tamarindus indica,* Linn.) of which theſe monks think themſelves the ſole poſſeſſors. The tree is, indeed, very rare in Lower Egypt, but is common enough in the Said.

The fourth monaſtery, which bears the name of St. Macaire, has only one well, and the water of this is ſalt: but at the diſtance of four hundred metres there is a copious well of freſh water,* as well as a ſpring on the oppoſite ſide of the valley. The other two monaſteries have alſo a ſimilar ſpring in their vicinity.

The cells of the monks are receſſes into which the ſun never penetrates, but by the door, which is a little more than a metre in heighth. The whole ſtock of furniture, and utenſils of each, conſiſts of a mat, a jug, and a kolleh.† The

ſuring him that it would become a tree. After ſome perſuaſion the young monk obeyed. A miracle took place, the ſtaff ſhot out roots and branches, and became a tree, which ever ſince has been called St. Ephrem's tree, or the tree of obedience.

* The depth of this well is five metres, its ſquare dimenſions about one metre and a third, and there is about one metre in depth of water.

† The kolleh, or bardak as it is more uſually called, is a large jar, made of ſlightly baked clay to hold water in, which is kept cool by expoſing the veſſel to a current of air.

chapels

chapels decorated with images coarſely painted, are kept tolerably neat, but beyond their precincts every thing is in diſorder, dirty, and diſguſting. The poverty of theſe monks not allowing them to decorate their chapels with any coſtly ornaments, does not, however, deter them from procuring the beſt ſubſtitutes that they are able; thus, inſtead of ſilver lamps, they make uſe of oſtridges eggs, which have a very pleaſing effect.

Several of theſe monks are blind, and all of them have a haggard, melancholy, and reſtleſs air. Their revenues being extremely ſmall, their chief ſubſiſtance is on alms. They live on beans and lentils prepared with oil: their time is paſſed in prayer, and even amidſt this ſea of ſand the ſmoke of incenſe ariſes, and the croſs ſurmounts the higheſt pinnacles. In the monaſtery of the Greeks are nine monks, eighteen in that of the Syrians, twelve in that of Amba-bicoi, and twenty in the fourth; all of whom are ſubject to the juriſdiction of the patriarch of Cairo.

We are unacquainted with the amuſements of theſe pious Cenobites, we perceived no indication of cultivation of mind or of manual occupation. Their whole library conſiſts of ſome Aſcetic manuſcripts on parchment or cotton paper, ſome in Arabic and the reſt in Coptic, with an Arabic tranſlation: we brought back with us

ſome

ſome of theſe laſt which ſeemed to be about 600 years old. The monks appeared to be flattered with our viſit, and our minute inſpection of the interior of their dwellings, and before our departure they offered to us, and we accepted the bread of the communion*.

A kind of forced hoſpitality is exerciſed by theſe monks towards the Arabs; nevertheleſs ſo ſuſpicious are they of their gueſts as never to travel from one monaſtery to another except by night. The wandering tribes in their journies through the valley ſtop under the walls of the monaſteries for refreſhments for themſelves and their horſes: theſe the monks lower from the top of the wall, for they never open the door in the preſence of an Arab. By means of a bag attached to a rope, they let down from one of the angles of the boundary wall ſome bread legumes and barley. They think it prudent to pay this tribute for fear of being robbed and aſſaſſinated if met with beyond their walls. Thus oppreſſed and expoſed to perpetual alarms, it is not ſurpriſing that they bear with impatience the dominant

* The communion-bread, made of unleavened paſte, is in the form of round cakes, about the ſize of the palm of the hand, and a finger's breadth in thickneſs, and covered with Arabic characters.

religion;

religion; ſuch is the fatal effect of religious prejudices and religious differences, that even in theſe holy retreats we were piouſly aſked *when we intended to maſſacre all the Muſſulmans?* Nor was this the firſt time ſince our arrival in Egypt that we heard ſimilar enquiries.

Such, however, is the combined influence of intereſt and ſuperſtition, as occaſionally to bring together theſe natural enemies. It is cuſtomary in ſome of the provinces when a Muſſulman is about to eſtabliſh a dove-houſe, for him to ſend an expreſs to the monaſteries of the deſert with the uſual preſent: the good monks courteouſly receive the gift, and ſend back in return a myſterious letter which, according to the common faith, if laid in the dove-houſe, will render the colony ſtrong and populous.

OF THE DJEOUABY ARABS AND THE BEDOUINS.

The banks of the Natron lakes are frequented every year by the Djeouabys*, a hoſpitable tribe who lead a ſhepherd's life, and encamp there

* The Djeouabys have for their leaders Karamit-abou-ghaleb, chief ſheik of the tribe, Hhadjy-thahh-aloudihil and Hhadjy-ica-abou-ali. This tribe is compoſed of about two thouſand men, and poſſeſſes about ſixty horſes.

every

every winter with their flocks. They are employed during this time in carrying natron and prickly reeds; they alſo have ſome traffic in dates which they fetch in caravans from Sioua in the Ammonian Oaſis: it is a journey of twelve to fifteen days. Theſe Arabs are *marabouths* or peaceful people, * who wander here and there to find water and paſture for their cattle. This tribe has more than any other, preſerved their ancient cuſtoms; they are merely ſhepherds, and refuſe to cultivate the ſoil. Their manners are mild, and partake of the ſimplicity of their way of life. They are not however exempted from the turbulence of the paſſions, and eſpecially that of love, which in every country, and eſpecially in the Eaſt, is cloſely allied to jealouſy, and this ſometimes hurries them into the moſt cruel exceſſes†.

The

* They never make war, and only take up arms to defend themſelves, and even this but rarely; they almoſt always trade for money.

† Haoud a reſpectable old man, head of a large family, and a dependent on Bhadjy Taha, had his only ſon aſſaſſinated in the arms of his wife. She had had a former huſband who repudiated her on frivolous pretences, but filled with love and rage, this atrocious wretch ſwore that he would kill with his own hand every one who ſhould marry her, and he kept his word. Haoud not being able

The cloathing of the Djeouabys conſiſts of an *ihhram* and a *bernous*, a kind of cloak ſimilar to the ſurplice which is worn by thoſe that officiate in the Romiſh church: it is made of white wool. This ſtuff which is uſed to clothe both men and women is manufactured in Barbary: it is bought at Cairo, but chiefly at Alexandria. The women ſpin the wool from their own ſheep to make the cloth uſed for their tents, and other common purpoſes.

The wealth of the Djeouabys, and in general of the Arabs of the deſert, conſiſts in camels and ſheep, whilſt that of the Arabs who inhabit the villages is in large cattle, for theſe laſt have but few camels. Who would imagine that in the midſt of deſerts a ſtile of eaſy circumſtances eſtabliſhes the ſame diſtinctions as with civilized people, and turns aſide natural propenſities? The Arabian women do not all ſuckle their own children, the more opulent employ wet nurſes.

to bear the ſight of the murderer of his own ſon, had retired to Upper Egypt, and, without wiſhing it, he had drawn with him ſeveral families. This unfortunate father perceiving that his retirement occaſioned diſorder in the tribe, has rather choſen to ſuppreſs his reſentment than injure the common intereſt, and has returned to Bhadjy Taha. But he appears always melancholy, his eyes filled with tears, and he drags out a languiſhing exiſtence.

Theſe

Thoſe mothers who do not abandon their children to hired nurſes appear equally ſuſceptible of the ſame feelings towards this tender age as the more civilized people. At the attack of an Arabian camp which was ſurprized by ſome of our troops, the men took to their horſes and fled with precipitation towards the Nile, abandoning the women to their fate. Theſe, whether by the impulſe of the moment, or from reflection, thought to protect themſelves from the fury of the ſoldiers, and retard their progreſs, by laying their children at the feet of their purſuers. This, however, did not ſtop our brave men, for in the midſt of purſuit they lifted from the ground theſe little innocents, gave them into the arms of their mothers, and continued as before to follow their enemies.

It is very difficult to prevent diſorder from reigning in a camp taken by aſſault. In theſe caſes the Arab women, under the apprehenſion of ſubmitting to the deſires of the conquerors, have been known to have recourſe to a ſingular ſtratagem in order to inſpire diſguſt, that of beſmearing over their faces with cow-dung.

The Arabs of the deſert bear the name of Khaiah Arabs, or inhabitants of tents, *khaiah*, meaning canvas. The village Arabs are called

Khaith, or dwellers within walls. Theſe laſt were once wandering tribes who gradually approaching a more cultivated country, at firſt dwelt in tents, but inſenſibly changed them for ſettled habitations like the fellahs of Egypt.

There is no kind of convention which binds the members of any tribe to the chief; he is almoſt always of an ancient family, and reſpected as ſuch; but to maintain his authority as the head of the tribe, he muſt employ perſuaſion, addreſs, accommodating manners, in a word, all the art of an experienced leader; he has, however, the right of making peace or war, and is charged with what concerns the general welfare of the tribe.

As ſoon as peace is made with a tribe, or a treaty commenced, the chief is inveſted with a cloak, or peliſſe; and this cuſtom of making preſents is ſo fully eſtabliſhed, that the contract would not be thought binding without this diſtinction.

The Arab ſheiks negociate with a ſort of dignity, or rather reſerve, like all other knaves. What has been called *eating bread and ſalt* with their new friends, and which has been thought ſo ſacred a pledge, is, in fact, a mere farce, conſecrated by cuſtom. The Arabs on each

each bank of the Nile have ſhewn that they pay no regard to the ſacredneſs of an oath: they violate their own treaties whenever fear or intereſt impels them to it.

When the Arabs preſent themſelves before a perſon whom they reſpect, they leave their horſes at about a hundred paces diſtance, and then advance on foot.

They know no other laws than that of retaliation. Where there are no penal laws, nor magiſtrates to put them in execution, murder would go unpuniſhed, if aſſaſſination did not in ſome degree ſupply the want of public energy. Hence it is that this, which with us is looked upon as a baſe crime, becomes a legitimate act of vengeance, which is purſued by the relations of the ſufferer from generation to generation.

Theſe murders conſtantly foment warfare between different tribes, or between the wandering tribes and the villages. It is then called *having blood between them.*

Sometimes, to *ranſom the blood* and to reſtore peace, a payment is made as a compromiſe; but this is accounted ſhameful, and thus the weak, or puſillanimous, become doubly tributary to the ſtronger.

The villages that refuſe to pay, are liable to be

pillaged three times. Theſe plunders ſtrike the country with terror, and make the inhabitants regard the Arabs as ſome of the moſt formidable ſcourges with which they are afflicted. I aſked a ſheik if he had had the plague this year in his village? "We have had," ſaid he, "the plague and the Arabs."

The Arabians, like all the inhabitants of the Eaſt, are much addicted to pæderaſty. The Arabs ſay five prayers in the day: they eat in the forenoon, and again before the fifth prayer, or at the end of twilight. Two inhabitants of the villages will conſume as much food as ten Arabs. Theſe make but little bread—to grind their corn they uſe hand-mills, furniſhed with ſmall grindſtones. They eat dates, drink little water, and camel's milk in preference, and ſleep about ſix hours. Fleſh meat is a rarity to them. They make no ſumptuous entertainments; a roaſted ſheep ſet on table entire, all but the head, which is cut off, is the principal diſh, and that is ſerved up whenever a ſheik is of the party.

The Arabs only meaſure their day by the ſtated times for prayers. They meaſure time by the length of their ſhadow: the ſhadow is meaſured with their naked feet, which they place alternately one before the other. Their rules for eſtimating

eſtimating are: That in the ſummer ſolſtice, mid-day is one foot from the vertical point; that in winter, at the ſame hour, the ſhadow is nine feet in length; that in ſummer the ſhadow which anſwers to the middle point of the interval from noon to ſunſet is ſeven feet beyond the place of the ſhadow at noon.—Theſe meaſurements are exactly conformable to the latitude of the country.

Theſe people, ignorant and credulous, are perſuaded that the treatment of a fever, and other diſeaſes, conſiſts in placing under the head of the ſick man a ſlip of paper containing ſome myſtic words, written by a derviſe; and the patient lies down full of confidence in this receipt, and ſtill more in Providence.

The women, when arrived at the full term of their pregnancy, find what aſſiſtance they require in delivery, among perſons of their own ſex, who make it their profeſſion. I was aſſured, that if the unmarried women or widows become pregnant, they are killed by the relations, unleſs they deſtroy themſelves.

The Arabs have a great dread of the ſmall-pox and the plague: thoſe who have not had theſe diſeaſes take great pains to avoid thoſe that are

ſuffering under them. The ſmall-pox leaves very conſiderable pitting in their faces. Notwithſtanding the prejudices of religion, the bodies of thoſe dead of the plague are burnt with the greateſt care.

The ages of their children are dated from certain events or periods: thus thoſe born this year will date from the entry of the French into Egypt. The Arabs have a kind of chronicle which comprehends about ten years. They have no public regiſters. The date of the birth of their children is written on a ſlip of paper over a page of the Koran, and that of the children of the village on the gates or walls of the houſes.

The want of chirurgical inſtruments gives riſe to a very ſingular cuſtom in gun-ſhot wounds, the intention of which (however fulfilled) is to ſupply the place of forceps to extract the ball when it has only made a fleſh-wound. This cuſtom is to make an inciſion in the hinder parts of a frog, of a correſponding ſize with the lips of the wound, and unite the whole with a good ligature. They pretend that this proceſs, and the convulſive movement of the dying animal, draws to the ſurface the ball that made the wound. They then dreſs the wound with oil or butter,

and

and burn it with verdigriſe, to hinder it from cloſing too ſoon. It is for the ſame purpoſe, and in order to promote ſuppuration, that they put in the wound a ſmall ſtone, which is the ſame with the cautery which is employed in Europe.

The Arabs always carry with them that which makes the greater part of their riches, and with which they proviſion their dwelling camps. They preſerve their chopped ſtraw and their grain in large pits dug under ground. The neighbourhood of a well of freſh water, a few ſlips of land of a ſcanty product, or ſalt lakes that can be worked with ſome profit, determine the ſite of theſe encampments. The Arabs poſſeſs beſides, at four or five leagues from the margin of cultivated countries, ſtore-houſes kept faſt cloſed, and further on in the deſert depoſits under the ſand known by ſome outward marks to the proprietors only.

The Djeouabys, in order to eſcape being pillaged by the wandering tribes, are obliged to receive them into their camps, and furniſh them with proviſions, and barley for their horſes. The Arabs of the deſert are a lawleſs predatory race, and had been in a ſtate of conſtant warfare with the Mamelukes, who, however, kept them in ſome kind of awe. On the firſt arrival of the

French

French the women of the Hennadys* chanted

Succeſs to the people who have driven Monrad from Cairo.
Succeſs to the people who have brought us into the villages.
Succeſs to the people who have fed us with *fouthyer* †.

Since, however, we have repreſſed their incurſions by vigorous meaſures, they have ceaſed to celebrate our arrival. The ſame diſtruſt ought to be entertained of theſe Arabs as of robbers and aſſaſſins: they are but little formidable as a military force, except where they experience no oppoſition; and the expeditions of the French in purſuit of them penetrating into the centre of their arid ſands and their deſerts, which were eſteemed inacceſſible, will, no doubt, be attended with the happieſt effects.

The principal weapon of the Arabs is a pike‡,

* Monſa-Abu-Ali is the chief of the principal tribe of Hennadys. They poſſeſs about three or four hundred horſes, and with their allies can muſter from 900 to 1000 cavalry. The Hennadys are the moſt ancient of the Lybian tribes that are known in Egypt.

† A kind of cake ſpread over with butter, which is eaten with honey, or more commonly with molaſſes.

‡ The pike conſiſts of a ſquared iron head, terminated by a ſharp point, and fixed to a pole from four to five metres long. The wounds made by this weapon are not ſo deep as thoſe of the lance, the head of which is compreſſed; but their conſequences are generally more ſerious, not unfrequently

which they wield, and throw with great dexterity. They manage their horſes with equal ſkill, and pay the greateſt attention to them; nevertheleſs, one of their practices appears to an European, at leaſt, very injudicious; it is that of checking the horſe on full ſpeed, and making him rear on his hind legs. The Arabs never attack in line, but always like foragers, uttering at the ſame time loud cries and invectives; their ſtyle of fighting being merely that of light troops.

The horſes of the Arabs are very ſwift, and they puſh them to their full ſpeed; at the ſame time, and without letting go the reins, which they hold in their left hand, they charge an enemy in front. If ſucceſsful they ſtrip him, and ſometimes cut off his head, which they bear in triumph at the end of their pike. When they miſs their blow they return to the charge by a half wheel to right or left, or endeavour to gain the 'vantage ground.

The Arabs are in general but ill equipped. Their fire-arms and powder are very bad; their balls are not well caſt; the powder is granulated

quently terminating in locked jaw. The Arabs eaſt of the Nile have, almoſt all of them, pikes or lances; but thoſe of Lybia carry fire-arms.

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in an inartificial manner, and is for the moſt part charcoal; they carry it in a wooden flaſk, and the balls ſeparately in a leathern bag, ſeldom charging their pieces with cartouches.

The Arabs bordering on Egypt were in the habit of ſending ſpies to Boulak, diſguiſed as huſbandmen, in order to learn the kind and number of the troops about to march againſt them from Cairo. As ſoon as their ſpies returned, the tribe broke up camp, and ſent far into the deſert their wives and children, and all their valuables. The men themſelves made a few days march to fatigue their enemies, and in the mean time, being joined by the confederate tribes, they either commenced hoſtilities or received the attack.

Every camp has advanced guards on the neighbouring heights, who carry their turbans on the point of their lances. If the camp is to advance, the vedettes march on the ſame ſide as the enemy, or the prey which they propoſe to carry off; if the contrary, the vedettes return towards the camp.

As ſoon as the Arabs are apprehenſive of an attack, they ſeparate into ſeveral ſmall camps at a great diſtance from each other, and tie their camels

camels to the tents ſo as to be able to move off at a moment's notice.

When one tribe is engaged with another, the women come within ſight of the combatants, playing on the tambourine, and ſinging ſtrains powerful to excite their courage: the wounded are taken care of by their wives or miſtreſſes. The women hold valor in great eſtimation, and a chief covered with ſcars is the boaſt of the whole tribe; thus the ſupport of empires is the band of union among theſe miſerable hordes of robbers.

A combat in which twenty or twenty-five men are killed, is reckoned a bloody battle, the date of which forms an important era.

It is neceſſary when marching during night in the deſert, againſt the Arabs, to be aware of a circumſtance, which would otherwiſe, often give a needleſs alarm of the preſence of the enemy; this is the light of the horizontal ſtars, which here, as well as at ſea, are very apt to be miſtaken for fires.

The natural encreaſe of mankind impoſes on them the neceſſity of ſeeking for ſubſiſtence; hence the forty thouſand Arabs that border upon Egypt, finding no reſource in their arid ſands, conſider this country as their own domain, and under

under this pretext, are perpetually making predatory incurſions. The government has often ineffectually, and never with more than partial ſucceſs, endeavoured to repreſs this miſchief: in the mean time the unhappy cultivator was expoſed to the vexatious oppreſſion of the agents of government, and the devaſtation and cruelty of the Arabs. Such was the condition of the inhabitants of Egypt; it is greatly to be wiſhed that it may be henceforth ameliorated.

Itinerary of the Expedition to the Natron Lakes and the Dry River.

Eſtimated or meaſured Diſtances.	Metres.	Hours.	OBSERVATIONS.
From Terranéh to Kaſſr. . .	. . . .	12	According to the rate of the caravans.
From Kaſſr to lake No. 3. .	628		
From Kaſſr to the South extremity of the lakes. . .	. . . .	1½	
From Kaſſr to the North extremity.	. . . .	4	
From Kaſſr to the monaſtery El-Baramous.	7,231		
From Kaſſr to the monaſtery of the Syrians.	7,430		
From El-Baramous to the monaſtery of the Syrians.	9,258		
From the monaſtery of the Syrians to that of Ambabicoi.	444		
From the monaſtery of the Syrians to that of St. Macaire.	. . . .	3	By eſtimation.
From El-Baramous to the Dry River.	. . . .	1½	Do.
From the monaſtery of the Syrians to the Dry River.	. . . .	1½	Direct. N. and S.
From St. Micaire to the Dry River.	. . . .	1	By eſtimation.
From St. Micaire to Ouardan, through Beny-Selameh. .	. . .	11	

On the 5th, we reached the Northern extremity of the lakes; on the 6th, the Monaſtery El-Baramous; and on the 7th, we croſſed the dry river.

Angles which certain Directions make with the Magnetic Meridian.

The direction from Kaſſr to the monaſtery El-Baramous - 102°
From Kaſſr to the monaſtery of the Syrians - - 180
General direction of the lakes - - - 44
The eaſt front of the monaſtery of the Syrians - - 7
The entrance of St. Macaire, N. & S. - - 10
The entrances of the three other monaſteries look towards the north.

Obſervations on the Natron,

By Citizen BERTHOLLET.

THE valley of the natron lakes preſents ſeveral objects worthy of particular attention. It is a vaſt laboratory, where nature prepares an immenſe quantity of ſoda, the uſe of which, under the name of natron, goes back to the earlieſt records of hiſtory, and for little more than the expence of collecting and carriage, the whole demand of the mother country may be ſupplied.

There are found in the ſix lakes already mentioned, ſalts that differ from each other even in parts of the ſame lake that have little communication with each other. Theſe are in general muriat of ſoda, carbonat of ſoda, and a little ſulphat of ſoda, but in various proportions, ſo that the carbonat of ſoda prevails in ſome, and the muriat in others.

The lake No. 3, which we particularly examined, is divided into two parts, the waters of which have ſcarcely any communication; the eaſtern part contains only common ſalt, and the weſtern little elſe than carbonat of ſoda, ſo that we find on one ſide of the lake, by ſpontaneous evaporation marine ſalt, and on the other carbonat of ſoda, each almoſt pure.

During

During ſummer, the ſaturated water depoſits ſaline cryſtals, and when it holds both muriat and carbonat of ſoda, the former cryſtallizes firſt, and then the carbonat of ſoda, ſo that there are formed alternate ſtrata of the two ſalts, which increaſe every year, provided they are not diſturbed. . . .

The water of part of lake No. 3, and that of No. 4 is red, as is alſo the muriat of ſoda which is depoſited: this colour is owing to ſome ſubſtance that is not mineral, but which burns, giving out ammoniacal vapours; when the ſame ſubſides on the carbonat of ſoda it becomes black.

The ſaline maſſes that cryſtallize in lake No. 4, or on its ſides, are the moſt eagerly ſought after by the caravans that bring the natron to Terraneh. The red colour which it has, gains it the name of Natron of the Sultan. We are informed that it is preferred in the Delta to any other for bleaching linen and thread. It is however, for the moſt part only common ſalt, and care ſhould be taken not to export it to Europe for fear of diſcrediting the trade.

The ſix lakes are in part ſurrounded with reeds. The ſoil which ſeparates them, and which forms the valley is in general covered with incruſtations, compoſed principally of maſſes of

carbonat of ſoda of greater or leſs purity, but partly of muriat of ſoda. There are ſandy ſpots that contain no ſalt, and others that are too wet and clayey to retain it. Some of the maſſes of carbonat of ſoda are more than three decimetres in thickneſs, and have acquired a hardneſs approaching to that of ſtone. Of ſuch are built the walls of Kaſſr.

We collected indiſcriminately ſpecimens of the natron in different beds around the lakes, and ſubmitted a determinate quantity of each to an aſſay. We diſſolved them, filtered the ſolution, dried the earth remaining on the filter, ſaturated the alkali of the liquid, and compared the quantity of muriatic acid neceſſary for its ſaturation, with that required by an equal weight of carbonat of ſoda deprived of its water of cryſtallization. The reſults of theſe experiments are given in a tabular form drawn up with care by citizen Regnault.

It might be ſuppoſed that the ſoil of the valley of the natron lake would be equally impregnated with the ſoda and muriat of ſoda which effloreſce or cryſtallizes on its ſurface. Several circumſtances however that we have remarked ſeem to prove, that the carbonat of ſoda owes its origin to the decompoſition of the marine ſalt.

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In that part of the lake No. 8, which I have ſaid only contains ſea-ſalt, is found a circular iſland that is covered with natron: the fifth ſpecimen, as marked in the table, was procured from thence. After having removed the cruſt of natron, the moiſt ſoil only contains muriat of ſoda: the carbonat of ſoda therefore which is found there ſurrounded with water that only contains ſea-ſalt, and upon a ſoil impregnated with ſea-ſalt, muſt neceſſarily owe its origin to this ſalt.

In like manner, in ſeveral places that are covered with ſea-ſalt, ſmall ſpots, ſometimes not more than a ſquare decimeter in ſize, are found, upon which natron has depoſited, formed in the midſt of ſea-ſalt.

The ſoil which is covered by layers or incruſtations of natron, does not itſelf contain a ſenſible quantity of ſoda; but it is always found impregnated with ſea-ſalt.

It appears therefore inconteſtable that the marine ſalt produces, by its decompoſition, the carbonat of ſoda which is contained in the natron, in all thoſe places where its depoſition is not owing to the evaporation of water.

Let us now examine what are the circumſtances which determine its decompoſition.

If the ſoil is too argillaceous no natron is found at the ſurface, but only ſea-ſalt, or at leaſt, it contains but very little carbonat of ſoda. If it is too ſiliceous, no ſalt at all is yielded, the rains having doubtleſs waſhed away every thing ſaline.

The ſoil in which this decompoſition of ſea-ſalt is taking place always contains a conſiderable portion of carbonat of lime, and has always been found in a moiſt ſtate. It appears then certain, that it is the carbonat of lime which occaſions the decompoſition of the muriat of ſoda, with which it is made to come in contact by means of the heat and moiſture. There is likewiſe found in every ſoil, whether clayey, chalky, or ſandy, a ſmall quantity of oxyd of iron, but which probably does not influence the formation of carbonat of ſoda.

Since the muriat of lime which reſults from the decompoſition of the muriat of ſoda is very deliqueſcent, it muſt doubtleſs ſink deep into the ſoil till it is itſelf decompoſed by ſome ſubſtance that it may meet with.

In thoſe places principally where the earth is too argillaceous, the production of the natron is ſingularly favoured by the ſtems of ruſhes, around which the carbonat of ſoda adheres as faſt as it forms, and gradually climbs to the top of the ſtalk,

ſtalk, ſo that it is not uncommon to find a ruſh covered with a thick coating of natron, whilſt the ſoil which ſurrounds it, contains only muriat of ſoda, mixed with a very ſmall portion of carbonat of ſoda.

When the natron which covers any ſoil has been carried off, it requires, as we have been informed, four years for its reproduction, if the ſeaſons have been moiſt, and ſix if they have been dry. It appears that the rains which fall in this part of Egypt, and which produce the beds of ſmall torrents that are ſeen around the lakes, ſerve not only to keep up the due degree of moiſture neceſſary for the decompoſition of the ſea-ſalt, but alſo bring with them this ſalt, whereby the land becomes impregnated and capable of decompoſition: ſo, in a higher plain near the former Coptic convent, we found a great extent of ground covered with a thick cruſt of marine ſalt, and in ſeveral other parts of the deſert, in the neighbourhood, ſimilar cryſtallizations of ſalt have been met with. The rain torrents in their paſſage to the lakes carry with them not only the ſea-ſalt, but the ſoda which may fall in their way, and hence, according to the courſe of the currents, we find the water in the lakes to con-

tain in particular parts, either ſea-ſalt alone, or carbonat of ſoda alone, or theſe two ſalts in different proportions.

The general reſult of theſe obſervations is, that the circumſtances which determine the formation of carbonat of ſoda are: 1ſt, A mixture of carbonat of lime and ſea-ſalt; and 2dly, A pretty uniform moiſture. The ſtalks of the reeds favour this production, by aſſiſting the efflorefence of the carbonat of ſoda, and the heat of the climate doubtleſs contributes to this effect. It is on the conſideration of theſe circumſtances that I mean to ground the explanation of this production in a memoir which I ſhall ſoon preſent to the Inſtitute*.

It will be ſeen by the table hereto annexed, that there are ſome ſamples of natron which contain much carbonat of ſoda, and therefore, may be looked upon as a very good ſoda, but that others are of a much inferior quality, ſo that in order to eſtabliſh the uſe of this article in Europe

* I began the reading of this memoir, which is entitled, "An Enquiry into the Laws of Chemical Affinity", at the laſt ſittings of the Inſtitute of Egypt, at which I aſſiſted. On my return to Paris, I preſented it to the National Inſtitute, where it has been read.

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with confidence, it would be neceſſary to have an intelligent agent on the ſpot, to ſelect the ſalt, and to fix different prices according to the goodneſs of the natron, which ſhould be determined, not by accidental changes of colour, but actually aſcertaining its contents in carbonat of ſoda. Theſe works would then become an important branch of the revenues of Egypt.

What would be ſtill more adviſeable, is to purify the carbonat of ſoda on the very ſpot where it is worked, or at Terranéh, the place where the caravans unload and depoſit their natron, ſo that it ſhould be quite free from earth, contain but little ſea-ſalt, and be manufactured in an uniform manner. Citizen Regnault has undertaken experiments to arrive at this deſired end, by which he propoſes to take advantage of the greater ſolubility of carbonat of ſoda, over muriat of ſoda, and the evaporation which may be produced by the heat of the ſun.

TABLE of Aſſay of the different kinds of Natron performed by ſaturation with muriatic Acid.

Parts	Parts of muriat. acid	Contained of extraneous matter.
100 Of carbonat of ſoda, cryſtallized, and ſerving for compariſon with the other experiments required for ſaturation —— ——	140,6	
100 Of natron effloreſced on the banks of the third lake	153,1	25 parts of ſand and chalk mixed
100 Of natron indurated and employed like ſtone in building the walls of Kaſſr ——	106,3	15 of ſand and chalk.
100 Of natron found in the reeds in the neighbourhood of Kaſſr —— ——	94,2	6.2 of ſand, combuſtible or coaly matter, and chalk.
100 Of natron found near the furtheſt lake ——	89,6	19 of ſand and chalk.
100 Of natron found on a riſing, ſurrounded by ſea ſalt near the lake, No. 3. — ——	85,5	8.3 of chalk, ſand, clay, and coal.
100 Of natron found near the firſt lake, and containingbut little ſoda, requiring for ſaturation only	47,9	15 of ſand and chalk.
100 Of natron of the kind called *ſultani*, and which is found near the lake, No. 2. It contains no ſoda, but is only ſea ſalt coloured with a vegeto-animal matter —— ——	0	8 of ſand.

As this laſt ſpecies of natron lies between alternate layers of carbonat of ſoda and muriat of ſoda, there was great difference found in the analyſis of different ſpecimens.

Obſervations

Observations on the dyeing Properties of the Hhennê.

By Citizens DESCOTILS *and* BERTHOLLETE.

The Hhennê is a ſhrub which grows in India, and is cultivated in Egypt, principally in the neigbourhood of Cairo. It is of the family of *ſalicaria*: it was known to the ancients under the name of cyprus, and was employed in dyeing the cloth with which the mummies were covered.

The leaves after being haſtily dried are beaten into a paſte, which is uſed to dye of a red orange the nails and palms of the hands.

The Hhennê when reduced to powder has an olive colour. By boiling with water it gives a very deep yellow orange liquor, highly loaded with colouring particles.

By long expoſure to the air this decoction, if diluted with water, loſes a part of its colouring matter, without, however, altering its ſhade, and brown pellicles form on the liquor.

The oxygenated marine acid deſtroys its colour, but it requires a large quantity to produce this effect.

Acid

Acids weaken the tint, alkalies render it deeper; but neither of them alter its tranſparency. Lime-water acts on the colour like the alkalies, but it makes the liquid turbid.

Muriat of ſoda produces no alteration.

Sulphat of alumine ſlowly produces a bright yellow depoſit, leſs tending to orange than the natural colour.

Nitro-muriat often occaſions more ſpeedily a pale orange precipitate.

Sulphat of iron troubles the liquor and gives a black a little mixed with green; but no precipitate ſettles to the bottom. Nitrat of iron gives a black precipitate approaching to green.

A ſolution of glue produces no precipitate, ſhewing that the Hhennê contains no tan, and cannot therefore be employed in tanning hides.

We dyed with a decoction of Hhennê a ſtrip of woollen cloth not previouſly prepared, another that had been alumed, and another that had been ſoaked in a nitro-muriat of tin, prepared with a mixture of nitric acid and muriat of ammoniac.

The firſt took a yellow colour approaching to orange.

The ſecond a brown yellow.

The

The third a yellow much brighter, and with more orange in it than the firſt.

Other ſpecimens took clearer colours when dyed with a decoction leſs loaded with colouring matter. By this means various gradations may be made to a very clear yellow with cloth not prepared, and as low as a grey a little mixed with green on alumed cloth.

By waſhing with ſoap, theſe dyed ſtrips took a more orange tint and a little weaker, but on the whole very little colour was loſt.

Stuff prepared with ſulphat of iron took a brown, bordering on green. A little of this metallic ſalt added towards the end of the dying proceſs gave ſomewhat of a coffee-brown, which appeared to us to be very good; by merely diping the cloth, after it has come out of the dye-vat, in a ſolution of ſulphat of iron, it acquires a brown tint which adds conſiderably to its beauty.

Some of theſe ſpecimens having been expoſed to the ſun for ſeveral days, appeared to have undergone no other change than having taken rather more of an orange ſhade. The alumed cloth, and that which had been prepared with ſulphat of iron, had not experienced the ſlighteſt change. The colours alſo reſiſted the action of

the

the oxymuriatic acid in the ſame manner as the moſt permanent dyes.

Cotton, both unprepared and alumed, acquired only a dull yellow colour; unprepared ſilk took a bad ruſſet-brown; but by means of nitro-muriat of tin acquired a good orange yellow.

The reſult of theſe experiments is, that the Hhennê abounds in colouring matter, which may be advantageouſly employed in dyeing wool; that by itſelf it gives permanent fawn colours, and that by means of alum and ſulphat of iron it may be made to yield different ſhades of brown, valuable for their variety, their cheapneſs and permanency.

EUDIO-

EUDIOMETRICAL OBSERVATIONS.

By Citizen BERTHOLLET.

SINCE the diſcovery of the compoſition of atmoſpheric air, various attempts have been made to aſcertain the relative proportion of the oxygenous and azotic gas, with all the variations ariſing from climate and other cauſes. A general acquieſcence has not, however, yet been obtained with regard to the beſt method of doing this.

Advantage was firſt taken of the property of nitrous gas to abſorb oxygen gas, and chemiſts were contented with noting the diminution of volume in the air thus examined, taking for granted that the purity of the air was in exact proportion to the diminution which it experienced.

Enquiry was then made into the real quantity of oxygen that combined with the nitrous gas, in order to determine, by the abſorption produced on mixture of the two gaſſes, the proportion of oxygen and azot in atmoſpheric air.

Nitrous gas, however, will not give the ſame reſult without great care in its preparation, as Ingenhouſe has ſhewn long ſince; when therefore

fore we wiſh to eſtimate from this the proportion of oxygen gas, we ſhall find ourſelves deſtitute of any fixed baſis for eſtimating what proportion of the abſorption is due to the nitrous gas, and what to the oxygen.

I find, by an extract in the *bulletin de la Société Philomathique*, which has juſt reached us, that M. Humboldt has endeavoured, by ſeveral ingenious experiments, to do away the uncertainty originating from variations in the nitrous gas, and that he offers as correct, a method of determing by this re-agent the exact proportion of oxygen gas, by introducing ſeveral corrections into his calculations. I hope, however, to prove from experiments that I am now engaged in * with citizen Champy, jun. that this method is founded on inadmiſſible ſuppoſitions.

Volta's proof by hydrogen gas is far more preciſe, but has the diſadvantage of requiring a complicated apparatus; and variations may be produced in the hydrogen from the quantity of carbon held by it in ſolution, ſo as to cauſe a ſen-

* Theſe experiments were not yet finiſhed when I quitted Cairo, and not having brought with me the minutes containing the calculations, I have been obliged to recommence my experiments, the reſult of which I ſhall ſhortly publiſh.

ſible

ſible difference in the reſult. This method may nevertheleſs be regarded as ſufficiently exact, when nothing more is wanted than the compariſon of different airs, and when the hydrogen employed is all of the ſame kind; but accuracy muſt not be expected in this way, if the intention is to determine the abſolute quantity of oxygen. The proportions by weight of oxygen and hydrogen that enter into the compoſition of water are ſufficiently well known, but the relative ſpecific gravities of the two gaſſes are not yet exactly aſcertained; the difference alſo obſervable in hydrogen renders it impoſſible to proportion accurately the reſpective ſhares of the oxygen and hydrogen in the diminution of bulk cauſed by their combuſtion.

Liquid alkaline ſulphuret preſents the double advantage of giving at the ſame time the relative proportions of the air ſubmitted to experiment, and the abſolute quantity of oxygen gas, for the whole dimunition is here due to the oxygen, whereas in the preceding methods it is divided between the oxygen and nitrous gas, or hydrogen. There is alſo no occaſion for any further corrections than what are required by the different temperature and atmoſpheric preſſure, at the time when the air was begun to be operated

operated on, and when the diminution was calculated.

It is impoſſible that the abſorption of oxygen ſhould be incomplete when water ſufficiently charged with ſulphuret is made uſe of, on account of the greatly ſuperior affinity between ſulphuret and oxygen, than between this laſt and azotic gas; and if any diminution ſhould be experienced, after the ſeparation of the oxygen, by mixing the azot with nitrous gas, this is not to be attributed to any remaining oxygen, as I ſhall preſently ſhow.

It muſt indeed be allowed that the volume of the remaining air is not preciſely the actual bulk of the azot, becauſe it holds in ſolution a little ſulphuret, or rather ſulphurated hydrogen, which always exiſts in the liquid ſulphuret; and this mixture may be detected by its peculiar ſmell; but by waſhing the azot with a little water its odour entirely diſappears, without any ſenſible decreaſe of its bulk, ſhewing the quantity of ſulphurated hydrogen to be extremely ſmall.

There is no fear of the azot itſelf being abſorbed by the ſulphuret, for if this abſorption begun it would go on, whereas the volume of azotic gas confined over ſulphuret remains permanent as ſoon as the oxygen is abſorbed.

It

It is poſſible therefore to determine, by means of the liquid ſulphuret, the proportion of oxygen contained in any air, with as great preciſion as can reaſonably be expected from chemical reagents.

The only inconvenience of this method is the ſlowneſs with which the ſulphuret acts, requiring ſeveral days, eſpecially at a low temperature, and giving no other certain proof of the completion of the abſorption than its actual ceſſation, which requires a ſtill farther time to be certain of.

Guyton has propoſed to make uſe of dry ſulphuret, applying to it the heat of a lamp by an apparatus that he deſcribes. I have not made trial of this method, but am inclined to apprehend that the contact of a ſmall piece of ſulphuret will ſcarcely enſure the abſorption of all the oxygen, and even if this were the caſe, it appears to poſſeſs no ſuperiority over the former method. I have propoſed, in the *Journal de l'Ecole Polytechnique*, the making uſe of the gradual combuſtion of phoſphorus; for this purpoſe a cylinder of phoſphorus fixed to the end of a glaſs rod is to be placed in a narrow jar, containing the air under examination; if the temperature is conſiderable, the jar ſhould be completely

immerſed in water, to prevent the melting of the phoſphorus, for the evaporation from the ſurface of the water keeps it conſtantly at a temperature a few degrees lower than that of the atmoſphere. Thus, during the experiments which I made here, the centigrade thermometer ſtood at about 36° in the open air, and the water-bath was about 6° lower. As ſoon as the phoſphorus is introduced into the air a cloud is immediately formed, which deſcends and mixes with the water. At ſoon as the operation is finiſhed the cloud, which is luminous in the dark, will have diſappeared, and no more ſenſible abſorption, even during the courſe of ſeveral days will take place, ſo that this method has the advantage of furniſhing a certain proof of the end of the operation: if made in a narrow tube it requires no more than two hours at the above temperature for its extreme abſorption *.

The air which is ſubmitted to the teſt is meaſured in a graduated tube; when the operation is concluded, the remaining gas is meaſured in the ſame tube, taking the accuſtomed precau-

* On repeating theſe experiments at Paris in a temperature fron 6° to 60° of the centigrade thermometer, I found the operation completely finiſhed in ſix or eight hours.

tions,

tions, and making the neceſſary corrections for the change of temperature or atmoſpheric preſſure which may have taken place during the trial.

The diminution obtained by phoſphorus is found always leſs conſiderable than that produced by the ſulphuret, but in a conſtant and certain proportion, the reaſon of which is, that the phoſphorus partly diſſolves in azotic gas, as I have proved by experiment, and in diſſolving it aſſumes the aeriform ſtate, as does every other ſubſtance during its ſolution in any gas. The volume of the azot is thus augmented, and from repeated experiments I have aſcertained the encreaſe to be nearly a fortieth of its bulk *.

We cannot attribute the difference of diminution in bulk occaſioned by phoſphorus over that from the ſulphuret to the latter abſtracting more oxygen than the former, for the action of phoſphorus upon oxygen is ſo powerful, when it is diſſolved in azotic air, that it is only neceſſary to paſs the phoſphorated azot through water to render it luminous, owing to the combuſtion of the oxygen which it meets with in that fluid.

* This experiment, repeated at Paris, gave me the ſame reſult.

It appears to me that ſulphurated hydrogen, when diſſolving in azotic gas, is capable of precipitating from it the greater part of the phoſphorus which it may hold diſſolved, for if phoſphorated azotic gas is put in contact with alkaline ſulphuret, the gas diminiſhes in bulk: however, the extent of this diminution is not ſo great as it would have been if the air had been at firſt placed over alkaline ſulphuret. The phoſphorate azot when thus diminiſhed by the ſulphuret is no longer rendered luminous by oxygen gas.

If I introduce phoſphorus into azotic gas already in contact with the ſulphuret it produces no ſenſible effect; but if I waſh this azot by paſſing through pure water, this is ſufficient to render the phoſphorus afterwards luminous: ſo that in this operation the water retains the greater part of the ſulphurated hydrogen, and ſupplies a very ſmall quantity of oxygen to the azotic gas, which by this means is rendered able to diſſolve phoſphorus, and this compound again to act upon the ſmalleſt poſſible quantity of oxygen.

Whatever truth there may be in the explanation of theſe facts, I have obſerved that azotic gas which has been expoſed to ſulphuret neither gains

gains nor loſes any ſenſible bulk when it is paſſed through water, and that the combuſtion which takes place afterwards, when phoſphorus is introduced, is in ſo ſmall a degree as to be almoſt inappreciable.

From what has been ſaid, we may conclude, that the eudiometer, by means of phoſphorus, unites preciſion to convenience, and does not require any troubleſome length of time; it likewiſe gives certain reſults when we only wiſh to compare different airs: it requires a correction of a fortieth of the bulk of the reſidual air, when we wiſh to determine the proportion of oxygen with the ſame accuracy as when the ſulphuret is uſed, and the whole appears to me to be the neareſt approximation to perfect preciſion which we can obtain by any known method*.

* M. Humboldt ſuppoſes that there takes place a triple combination of phoſphorus, azot and oxygen (*Ann. de Chymie*, 30*th Thermidor*, *an.* 6). His opinion is founded on experiments in which he has obſerved, that phoſphorus produced unequal diminution of both in atmoſpheric air expoſed to its action in tubes of equal dimenſions, and in the ſame circumſtances. The difference in two experiments was in the proportion of 115 to 156. It was upon this reſult alone that he ſuppoſes the exiſtence of oxygenated phoſphoret of azot. I have perceived no differences of the kind in the numerous experiments which I made at Cairo and at Paris.

A variety of experiments made by citizen Champy the younger and myſelf, in the laboratory of the Inſtitute, both with alkaline ſulphuret and phoſphorus, and in which we did not neglect the corrections required by the change of temperature, as well as by the dilatation of azotic gas by an acquiſition of phoſphorus, have convinced us that the proportion of oxygen in atmoſpherical air was in this place ſomewhat leſs than 22 in the hundred; and as by a great number of experiments we in no caſe found a difference of more than half a hundredth part, it is more natural to attribute ſo ſlight a variation to an inevitable imperfection in every proceſs of experimental philoſophy, than to any real change in the ſtate of the atmoſphere.

Repeated trials made by myſelf at Paris by the ſame means, appear to ſhew, that the proportion of oxygen in this place is nearly the ſame as at Cairo.

However, I muſt acknowledge, that I have not ſo accurate a recollection of theſe experiments, as to be able to affirm this with the ſame confidence. It will be neceſſary to repeat theſe trials, to arrive at a certain concluſion*.

Several

* The experiments which I have juſt made at Paris, give me one, two-hundredth more of reſidual air: they coincide perfectly

Several eminent chemists and natural philoſophers allow a greater proportion of oxygen in atmoſpheric air than what I have given, and they aſſert that they have found conſiderable variations in the air of different places and at different ſeaſons. Lately Humboldt has made the proportions of oxygen vary from 28 to 29 in the 100.

I have not obſerved ſuch alterations in the diſtance from Cairo and Paris, in a variety of ſeaſons and climates: they certainly ought to be attributed to the ſtate of the nitrous gas, which is

perfectly with thoſe which I made at a former period. It appears probable that this ſlight difference is owing to the very dry air of Cairo, ſaturating itſelf with water during the experiments, and thereby experiencing a ſlight dilatation, rather than any real difference in the conſtitution of the air of the two atmoſpheres; but however the reſult is, that the proportion of oxygen gas ſhould be fixed a little above 22 in the 100.

Experience muſt decide between the opinions of M. Humboldt and myſelf. It will be ſufficient to examine whether it is true that phoſphorus and liquid ſulphuret produce an uniform and conſtant reſult, as I have affirmed that they do: I do not ſpeak of the rapid combuſtion of phoſphorus, concerning which there would be other conſiderations to be noticed.

When the ſlow action of phoſphorus is had recourſe to, the ſtick of phoſphorus ſhould occupy a great part of the height of the tube in which the trial is made, in order that the whole of the atmoſpherical air may be expoſed to its action.

uſually employed for theſe experiments. It is agreed on all hands, that trials with this agent cannot be compared one with another, if there happen to be any difference in the water made uſe of, in the nitrous gas, in the dimenſions of the tubes, in the way of conducting the experiment: yet the favourers of this method ſwell, with great ingenuity, the liſt of neceſſary corrections, founded on ſuppoſitions which are not juſtified by experience; and on the other hand, reject thoſe conſtant methods of eudiometrical obſervation on which no juſt ſuſpicion has been thrown, and which perhaps are only laid aſide in Europe, becauſe they have ſo much ſimplicity.

How, indeed, can we ſuppoſe that the atmoſphere, continually agitated by rapid motions, and continually changing its place with a reſtleſs activity, can vary conſiderably in compoſition from village to village; allowing however for thoſe ſpots that are greatly elevated above the level of the ſea. The difference of ſpecific gravity between oxygen and azot, which in their elaſtic ſtate exert but a very weak reciprocal action, is ſufficient to explain the difference which has been found in their reſpective proportions.

OBSERVA-

OBSERVATIONS

On certain Proceſſes for correcting the Defects of particular Kinds of Steel and Caſt Iron.

By Citizen LEON LE VAVASEUR, *Chief of Brigade, Director of Artillery to the Marine in the Port of Alexandria.*

FOR a conſiderable time that I have been employed in directing the labours of the arſenal, I have always conſidered it of great importance to turn to ſome uſe the ſtuff which is thrown aſide as faulty, or to diminiſh thoſe defects which cauſe it to be rejected. When we are abundantly ſupplied with means for carrying on theſe operations, and have an ample choice of materials, it would be doubtleſs abſurd to work in preference upon thoſe that are imperfect. Beſides, that it is almoſt impoſſible to give ſuch materials entirely the ſame goodneſs as thoſe which are at firſt of excellent quality; ſuch an attempt muſt neceſſarily be attended with a great encreaſe of expence, which a prudent overſeer will always avoid; but at the ſame time, he ought to be provided againſt the time when a proper ſupply may fail, and when he will be reduced

duced to the neceſſity of bringing into uſe ſuch ſtuff as in a time of plenty is thrown aſide as waſte; and therefore he ſhould be prepared beforehand with the means of continuing his work even in the time of a ſcarcity.

It has often occurred to me, that I might be ſent into a colony almoſt unprovided with neceſſaries for an arſenal, or at leaſt only furniſhed with all kinds of refuſe matter from the magazines of Europe, and that on this account I ought to qualify myſelf to overcome by art and induſtry the difficulties which would be thrown in my way.

Iron is the metal to which I have particularly turned my attention, as it is that which furniſhes the inſtruments of the firſt importance in all arts.

The metal may be defective, either from a faulty preparation in the forges where it is firſt procured, or from its nature in being intimately united to foreign ſubſtances, to ſeparate which, common means have hitherto proved inſufficient.

In the firſt caſe, the iron is ſcaly, porous, and has but little tenacity.

In the hands of a workman of a little dexterity theſe faults however may ſoon be removed: repeated forging and hammering, conducted with ſkill,

ſkill, and well followed up, will bring together the open porous texture, and produce a tough cohesion, inſtead of a mere grain, eſpecially if it has not been cooled too haſtily.

This will not be the caſe, however, where the defects are inherent in the nature of the iron, and ariſing from its more or leſs intimate combination with foreign ſubſtances that render it brittle, and give great trouble to thoſe workmen who do not know how to manage it.

We diſtinguiſh two kinds of faulty iron, the hot-ſhort, called by the workmen, ruſſet coloured iron *(rouverain)* and the cold-ſhort, which is brittle when cold.

The former, which is very tenacious when cold, breaks under the hammer when hot, and is commonly thrown aſide in arſenals as the worſt kind of iron: it is, however, the moſt valuable, to thoſe who know how to work it, and I mean here to give a very ſimple method of managing it, which I learned in the department of Iſere, where it is very common, and which has anſwered with ſucceſs the trials that have been made of it in the forge of the ordnance in the dock-yard of Toulon.

This iron muſt be heated to whiteneſs, and almoſt till it melts, and forged in this ſtate; when its

its glow abates, and it begins to grow red, the forging muſt be ſtopped, for it is at this time that it becomes brittle under the hammer, and would ſplit if the hammering were continued. When it is become of a faint cherry red, it may be again worked, and forged till it is cold. The cooling may indeed behaſtened by plunging it in water.

I proved ſome hot-ſhort iron thrown aſide as refuſe at Toulon, and wrought it the ſame way I have juſt been mentioning.

There are two methods of trying the tenacity of iron; the one by means of a weight ſuſpended at one extremity of a bar, whilſt the other is firmly fixed in a wall; the other by means of twiſting. For this laſt trial I fixed in a vice a bar made with an eye, through which was paſſed a lever of iron: it required a great force to twiſt off the ſtem of that made of hot-ſhort iron, whilſt another made with what paſſed for the beſt iron in the forges broke with eaſe.

In the firſt trial (by means of a weight) the mean degree of tenacity was found to be in favour of the hot-ſhort iron in the proportion of 4 to 3. The degree in the ſecond trial, which was much more to the advantage of the hot-ſhort iron, could not be aſſigned with accuracy.

I recollect

I recollect an anecdote on this ſubject, which happened at Toulon in 1749, which confirms what I have been juſt mentioning, and which was taken down at the time in writing.

" The forge-maſter of this port, in the intereſt " perhaps of the iron-maſters of Franche Comté, " wiſhed to put down the iron of St. Gervais, in " Dauphiny; and had forged certain pieces of " this iron, which was found defective.

" The adminiſtration of the marine thought " that they ought not lightly to paſs a condem- " nation on this iron, which had ſo long en- " joyed a high reputation: they therefore named " a commiſſion, which was to cauſe comparative " experiments to be made before them of the " iron of St. Gervais and that of Franche Comté, " wrought by forge-maſters of the town who " were in the greateſt credit for ſkill and fair- " neſs; and a maſter came from St. Gervais for " this purpoſe. A hook was forged out of iron " of each ſort; that of the Franche Comté was " fourteen lines and a half in diameter; but for " want of ſufficient material, that of the St. " Gervais iron was only thirteen lines and a " quarter: but notwithſtanding this unfavour- " able circumſtance, the latter was found much " ſuperior. Each of theſe hooks was ſtruck " with

" with a force perfectly equal and ſimultaneous, " by means of proper apparatus; that of Franche " Comté iron broke in three places; but the " St. Gervais reſiſted the force ſo well, that it " was compreſſed by the blow, but not broken. " After ſo deciſive a proof, the St. Gervais iron " was judged ſuperior to any other for works " that required flexibility and elaſticity, as ſhip's " chains, maſt rings, &c."

In ſpite of theſe trials, however, former prejudices prevailed ſo far, that at the end of the year 5 there was in the arſenal of the fleet at Toulon a conſiderable depoſit of this iron, which had been thrown aſide, and which the adminiſtration were happy to ſell at a very inferior price.

It muſt be acknowledged, that the high degree of heat requiſite for working this iron, and the number of forgings that it is neceſſary to uſe, occaſion a much greater expence, both in fuel and labour, as well as a more conſiderable loſs, which makes the uſe of this iron by no means economical. But where it is of the greateſt importance to obtain a great degree of ſolidity and tenacity, as in ſeveral neceſſary works, economy ſhould be only a ſecondary conſideration.

I ſhould

I ſhould therefore adviſe the employing always in preference, and without regard to the encreaſe of expence, the hot-ſhort iron for all works where there is much ſtrain, as in ſhip chains, rigging hooks, maſt rings, and the like.

Since the trials that I have mentioned above, there have been manufactured at Toulon, out of this iron, all the neceſſary iron works for the waggons uſed to tranſport to Paris the ſpecimens of the arts which were obtained in Italy.

I may juſt mention, that the ſprings of theſe carriages were made of ſteel, of cementation in like manner made from this material.

Hot-ſhort iron appears to owe its fragility to the union of ſome other metal, but we do not yet know what it is. It has been thought to be arſenic or zinc; I rather am inclined to think that copper alſo has a ſhare in producing this effect. The ore of the mines of Alevard, which ſupply the ſmelting furnaces, and furniſh metal for all the forges in the department of Iſere, often contains grey copper ore. There is likewiſe found another copper ore, called marcaſite, which is carefully rejected, becauſe it makes the metal very bad, and difficult to work.

I believe I have read in Jars, that a ſlight addition of copper gave more body to the iron.

The

The different degree of fusibility of these two metals occasions the difficulty which is experienced in attempting to forge this iron at the usual degree of heat.

If the alloy, whatever it be, enters into fusion before the iron, the union between the parts ceases, and the bar flies under the hammer. If the heat is so great as to soften the most refractory of the two metals, they will remain in union, and may be worked without risk: so soon, however, as the temperature is lowered, the incoherence recommences, and it is necessary to wait till the mass is become cold before it can be safely wrought, such are the circumstances that require attention in the working of hot-shot iron. The effect of the high heat to which it is necessary to expose this kind of iron, is obviously not the volatilization of the alloy; if this was the case, the iron, after the volatilization of that which rendered it hot-short, would become pure: but, on the contrary, hot-short iron always preserves its peculiar properties, and every time that it is worked the above precautions are absolutely necessary.

The cold-short irons may be ranged in two classes; the first including all those varieties which owe this property to mismanagement in the refineries,

ſmerica, the carbon that they contain in the ſtate of caſt-iron not having been completely burnt off, ſo that they ſtill contain ſome particles of ſteel.

The ſecond claſs comprehends thoſe which owe their brittleneſs to phoſphorus, or the phoſphoric acid, with which they were combined while in the ore, and from which the ſmelting furnace can ſcarcely ever free them.

The projection of weak nitre acid upon the metal will eaſily diſcover the firſt claſs, by producing black veins, which detect the charcoal.

The ſecond is diſcovered by adding ſulphuric acid, which will not diſſolve the phoſphat of iron.

I have ſucceeded in ſoftening and rendering flexible the wrought iron of the firſt kind, by treating it in the manner of too hard ſteel, when it is to be ſoftened to be cut into files. I ſhall ſpeak afterwards of the particulars of the proceſs.

With regard to iron which owes its brittleneſs to the preſence of phoſphorus or phoſphoric acid, I look upon it as very difficult to correct this defect, except in the refinery. The method followed by Rinman the ſon (*Journal des Mines* No. 5. Pluv. an. 3.) is as follows:—He begins

by melting together equal parts of lime and fourne; of this vitreous matter he mixes one hundred and forty parts with two hundred and sixty parts of cold-short iron, and, by fusing the whole together, obtains one hundred and ninety parts of bar iron, soft, and of the best quality.

My distance from a work-shop, at my own disposal, prevented me from making many experiments on the conversion of cold-short iron to the state of bar iron; I have however made a few, and with moderate success, though not sufficient to satisfy myself. In fact, though I succeeded in giving to cold-short iron more tenacity than it had at first, I have however never been able to make it equally good with that which was originally free from this defect.

As no one attaches less importance than myself to what are called secrets, and as the success of another is as pleasing to me as my own, I shall enter into a detail of the processes that I have tried, in order that any one who has occasion to undertake similar pursuits may derive some advantage from them.

I regret not having brought with me the register of the results of my experiments; in this it would have appeared that though I have not always succeeded to my entire satisfaction, yet

that

that I have constantly obtained some advantages from my operations. I made use of two methods; the one, cementation with lime, the other forging in lime. I first reduced my bars to thin plates, then soaked them in thick milk of lime, and afterwards heated them, taking care to cool them again in milk of lime; I then softened them in a very high heat, and sprinkled them over with fine slacked lime and forged them; I then doubled the plates, and forged them to the necessary dimensions, taking care to expose them as much as possible to the contact of lime.

It is obvious that the length of these operations would occasion a great consumption of fuel, and much consequent expence, but in circumstances where none but cold-short iron was to be had, the cost might well be endured, provided this very important defect could by this means be considerably remedied.

To return to the different kinds of steel. The want of steel in the marine arsenal at Toulon, during the years two and three of the republic, and the vast demand for it at all the workshops, induced me to undertake, in those belonging to the marine artillery, a manufactory of steel of cementation, according to the process published

by the Committee of Public Safety. I was tolerably ſucceſsful, and during nearly two years the arſenal of Toulon made uſe of ſcarcely any other than what came out of the furnace that I had eſtabliſhed; I made of it all kinds of tools and files, but the fabrication of theſe laſt gave me much trouble. My ſteel, although untempered, was frequently ſo hard as not to be cut by the ſheers, breaking rather than bear being cut into ſhape. All the common receipts of the workmen, each of whom has his peculiar compound, were of no avail, and I had alſo an objection to making uſe of thoſe whoſe action I could not explain: at length I tried the following, and had the pleaſure of finding it completely ſucceſsful.

I oxydated, by expoſure to air or immerſion in water, the outſide of the bars of ſteel which I wiſhed to ſoften, and in the ſame manner reduced to oxyd, iron filings, chippings, and other refuſe pieces (the native ochery oxyds of iron, and eſpecially black manganeſe may be made uſe of for the ſame purpoſe); theſe oxyds and the ſteel bars were ſtratified in a caſe which was ſtrongly heated, as if for the cementation of ſteel: a proof piece placed in the centre of the caſe ſerved to ſhew the progreſs of the operation; as ſoon as it had proceeded far enough the fire

was

was ſuffered to go out, and the caſe to cool gradually. The oxygen furniſhed by the oxyds of iron had burnt out the carbon from the outer ſurface of the ſteel bars, and had ſuperficially converted them into iron, as was evident from the eaſe with which they were worked by the graver or file; another proof of this was furniſhed by the action of the nitric acid, which left a white ring round every drop, whereas on ſteel it makes a black border. Some bars were by the above proceſs wholly converted into iron, which worked juſt the ſame as common iron.

Thoſe bars which were intended to be made into files, were firſt ſhaped and ſtamped, and then cemented in the common way, by which means they were re-converted into hard ſteel.

I baniſhed from the materials of cementation the garlic, vinegar, oxgall, and all the other ſauces with which the workmen from father to ſon had been accuſtomed to ſeaſon this operation, the only ſubſtance which I made uſe of was charcoal, moiſtened ſometimes with urine; and even this laſt article may be ſuppreſſed, being even prejudicial in certain caſes, but I have obſerved where great hardneſs is required, and where the brittleneſs is of no conſequence, that it was of uſe, probably by forming a little phoſphat of

iron. In the ſame caſe, namely that which was filled with the oxydated cement, I put ſome pieces of a very hard iron incapable of being worked by the graver and the common tools; it was rendered quite ſoft: I then ſuppoſed that the iron was in part carbonated, and was convinced of this by the teſt of the nitric acid.

I alſo put in the ſame caſe a few pieces of very hard and brittle caſt iron, ſome of which were ſo completely ſoftened as to be capable of filing and working juſt like the beſt ſoft iron; one of theſe pieces compared with regard to its tenacity with another of the ſame kind was found to be in the proportion of five to three.

Other pieces of the ſame ſize, the ſame hardneſs, the ſame external appearance, and prepared in the ſame manner, underwent no change in the operation. This difference of reſult at firſt diſconcerted me, but I ſoon after diſcovered the reaſon.

Steel differs from iron only by the addition of carbon; but in caſt iron there is beſides carbon a variable proportion of oxygen, and the relative proportions of the two ſhould be carefully attended to in the converſion of caſt iron into bar iron.

If the oxygen and carbon are at the point of mutual ſaturation, it is only neceſſary to apply heat

heat to bring them into combination; in this case all the earthy cements may be employed, but the best of these is lime, on account of the ease with which it absorbs the carbonic acid as soon as formed. If the oxygen is in excess, carbonaceous cements with lime ought to be made use of; if the carbon exceeds, then the oxydating cement, which converts steel into iron, brings about the desired effect.

My conjectures on this head were further verified by the nitric acid, all the pieces of cast iron which had remained unaltered by the cement being white iron, upon which the oxydating cement could have no action; that piece which on the other hand had been so much softened was black iron. It is no longer therefore surprizing that there was a want of uniformity in the results, since each species of iron requires a different cement. It is scarcely necessary to say that the oxydating cement may be used for any number of times, care being taken to restore to it, by the contact of air and water the oxygen of which it has been deprived after each cementation.

None of the experiments of which I have given an account were made by myself, on account of my absence from Toulon, but I direct-

ed them by means of a correſpondence which I held with citizen Thuez, at that time an officer in the artillery ſhops of the marine at Toulon, and at preſent head of the ſame department in the port of Alexandria. He uſed to write me an account of the reſults, from which I directed the ſubſequent experiments.

The whole of this buſineſs has been tranſacted by him with great accuracy and ſkill, and the correctneſs of his reports may be depended on. If I had been myſelf on the ſpot, I ſhould have made many more experiments; ſuch as they are, however, they will not I truſt be deſtitute of intereſt, and this has been my inducement in drawing up the preceding account; it is poſſible alſo that they may be here applied to advantage, and this is a ſufficient apology for them, if they ſtand in need of any.

REPORT

REPORT ON THE OASES.

Citizen RIPAULT *presented to the Institute, a Memoir, intitled, "Researches on the Oases;" and Citizen* FOURIER *read the Report of the Commissioners appointed to examine that Memoir.*

THE Oases are tracts of cultivated land, situated like islands, in the midst of the deserts of Lybia. In these cantons an abundance of water preserves perpetual vegetation; a profusion of trees of different kinds adorn the soil, and the inhabitants collect a considerable quantity of fruit.

The writers of Greece, and those of the middle ages, have described this species of islands with an accuracy which might have been deemed satisfactory, if their text had not been obscured by a multitude of commentaries. These discussions have involved this subject in an uncertainty, which it is necessary to dissipate.

Strabo hath enumerated only three Oases, although many other cantons may be included under that denomination. The principal object of the memoir of citizen Ripault was to ascertain with

with precision the position of those three Oases, which he has done with much distinctness.

The first, or the *Oasis magna*, is situated, almost as high as Jirjeh, in the parallel of 26 degrees and a half. The second, or *Oasis parva*, is in the latitude of 29 degrees, 2 minutes, which is nearly the parallel of Beniçouef. With regard to the third Oasis, the author of the memoir has made it appear, that it is none other than the little country now called Siwah, concerning which he collected, at Alexandria, much interesting information: its latitude is 29 degrees 20 minutes.

The writer whose opinion is most opposite to that adopted in the memoir, is the author of questions proposed to the Danish travellers*. His opinion is confusedly stated, in the Latin commentary on Aboulfeda; but, as it almost directly contradicts the accounts of Herodotus, Strabo and Ptolomy, any refutation of it seems unnecessary.

There is scarcely an article in the ancient geography, on which more errors have been committed, than on the subject of the Oases. Modern travellers and historians appear to have entertained very incorrect ideas of them. Savary

* Michaelis.

alters

alters their latitude several degrees, places the Oasis of Ammon at random on his map, and banishes thither the great Athanasius, though that saint never was there: and he advises those who would undertake to recover the ancient literature of the Egyptians, to search those islands carefully for books, which, being lost to the rest of the world, cannot fail to be there!

Niebuhr and Norden make no mention of any of the three Oases; and Pocock briefly reports what had been written by others on the subject. But the positions of the two first are determined with precision in the maps of Danville; though, in tracing the Ammonian Oasis, that illustrious geographer does not distinguish it from the temple of Ammon, and places, at a little distance from its site, the ancient city of Marcotis, on the territory of Siwah.

Doctor Poncet and Lenoir du Roule are the only Europeans, who are known to have penetrated into the great Elouah; and, by the accounts of the former, that country is not less than twenty-five leagues in length, and four or five in breadth. The papers of the latter were lost at Sennaar, where that ambassador of Louis XIV. perished in a tumult; the victim of his own zeal

zeal, and the machinations carried on in a convent*.

Siwah is ſituated to the weſtward of Ammon. A young Engliſhman, of the name of Browne, whoſe

* The converſion of Abyſſinia to the catholic faith, has ſeveral times excited the zeal of miſſionaries. The reformed Franciſcans, and the fathers of the holy land, who contended for the miſſion to Egypt, were ſtill more ardently ſolicitous to be charged with the re-eſtabliſhment of the Romiſh religion in Ethiopia. The prieſts of the holy land poſſeſſed moſt credit at Rome; but their rivals, the Franciſcans, ſupported their pretenſions, by repreſenting the numerous ſervices which they inceſſantly rendered to the Chriſtians in Nubia. Not that there were any other Chriſtians than the Franciſcans themſelves in that country; but they indulged that ſuppoſition, without which their miſſion would have had no object.

During this conteſt, the enterprize, of which they mutually ſtrove to have the honour, flattered the ambition of the Jeſuits. That order then poſſeſſed no influence at the court of Rome; but they had recourſe to the powerful mediation of Louis XIV.

That monarch repreſented to the pope, that the Jeſuits were much more capable, than the Franciſcans and Capuchins, of ſecuring the triumph of the faith in Ethiopia. The pope appeared to acquieſce; but, at the ſame time that he authorized the Jeſuits to fulfil the religious views of the king of France, he charged a monk of a different order, with the execution of his own deſigns; and, as if he had had a mind to beſtow the country on the firſt occupant, he added, that the moſt able might make a beginning.

The

whose travels are now in the press*, hath visited the temple of Ammon, and the country of Siwah. Citizen Ripault hath collected from the inhabitants

The Jesuits, to elude this new competition, made application to the French consul at Cairo. That officer, the author of *Telliamed*, an impious work proscribed by the Sorbonne, and the Jesuits, whose ambitious conduct had before expelled them from Abyssinia, laboured in conjunction with the king of France, to supplant the monks of St. Francis, in the project of converting the people of that country. The Jesuits, according to their custom, had furnished a political motive for that intrigue; and shewing as much zeal for the glory of the monarch as for the interests of religion, they engaged to prevail on the king of Abyssinia, to send a pompous embassy to Louis XIV. The consul, Maillet, seized this idea with avidity, and took advantage of the first opportunity which presented itself.

Jesus *(Yeçous)* king of Abyssinia, had long laboured under a malady, for which he had in vain consulted his own physicians, and he therefore invited the most learned of that profession, from other countries. Hajy Ali, who was charged with that commission, was afflicted with the same disorder, and consequently was to experience, in his own person, the effects of the remedies prescribed. Charles Poncet, a French physician residing at Cairo, was recommended by Maillet; instead of two Capuchins, who practised medicine, and whom Aly had himself chosen; and the consul gave him, as a companion, Father Brevedent, a Jesuit, who possessed a great character for knowledge and piety.

* Browne's Travels have since been published in London.—*Translator.*

inhabitants themselves, the accounts which are subjoined to his memoir.

The civil history of the Oases is but little known,

piety. To avoid the uneasiness he was likely to experience, under the justly dreaded name of a Jesuit, the father attended Poncet as his servant. He was one of the most ardent missionaries the church ever possessed. His brethren have bestowed many eulogies on his sincerity and zeal; and he confirmed their testimony by working miracles, of which Poncet said he had been a witness. Bruce adds that Father Brevedent was an excellent mathematician; of this we have proofs, in the writings of that period, which shew that he had sought and *found* a perpetual motion!

It required indeed nothing less than a man accustomed to perform impossibilities, to establish the Romish religion in a country where the Jesuits had already developed their views, and where the outrages committed by the Portuguese, some time after the expedition of Gama, had rendered the name of European odious. The double talent of the French Jesuit was not more useful to the progress of religion, than to that of the sciences; for, after taking the latitudes of some places, in which he appeared to be grossly mistaken, he died before he reached Gondar, like Saint Francis Xavier, within sight of China, which he went to convert.

Poncet continued his journey, and according to his own account, soon after his arrival in the capital, he cured the king and the royal family. The Jesuits afterwards printed an account of his journey in the *Recueil des Lettres Edifiantes*, accompanied with a recital of every thing which could be useful to their interests. There we read, that Poncet

known, and cannot be supposed very fertile in events. According to Herodotus, fifty thousand men belonging to the army of Cambyses, employed in

set made a strong impression on the Abyssinian monarch, whom he daily entertained with anecdotes of Louis XIV. assuring us that that prince was known in Ethiopia as the hero of Europe, and France, as the finest country in the world; that king Yeyous had long resolved to send an embassy to Paris; and that his own son, then but eight years of age, and consequently too young to undertake the journey, was already destined to fulfil that important trust; that the king had a singular taste for the sciences, and that he received lessons in chemistry from the physician at Cairo; that he conversed very learnedly with Poncet, on the distinction of the two natures of Jesus Christ; that he had himself discovered the error of the Copts and the Eutychians, and that he was not far from agreeing with the Jesuits concerning that important question, on which depended the salvation of Abyssinia. Poncet, on leaving Gondar, brought an ambassador with him. It appears that an Armenian stranger, of the name of Mourat, was in fact entrusted with letters and some presents for the court of France, and that he came to Cairo with Poncet, who alone brought the accounts to Paris. The Consul Maillet had a dispute with the Ethiopian ambassador; and, on the other hand Poncet, whose first reception was very flattering, was ill treated by several of the dignified clergy in France. They maintained that his journey was an imposture; that he had never been at Gondar; and that Ethiopia was a very different country from that which he described; and they supported these

reproachse

in attempting the unprofitable conquest of the country of the Ammonians, perished in the sands, at some distance from the great Oasis. The author

reproaches with the most puerile arguments. Thus were Poncet and Mourat abandoned to their fate.

In France, however, the project of preaching the Romish faith in Ethiopia was persisted in; and it immediately became a question, how the first advances of this outlandish king should be answered. The embassy was offered to Maillet, who, dreading the fatigues and dangers to which the enterprize would expose him, recommended Le Noir du Roule, the French vice-consul at Damietta, as a proper person to undertake it. That young Frenchman was distinguished by his zeal for the interests of his nation, and by the brilliant qualities of his mind. The glory of the mission seduced his imagination, and he fulfilled it with more enthusiasm than prudence.

He set out from Cairo in 1704; and soon became sensible of the difficulties and dangers with which he was surrounded. In truth, the Franciscans and the Capuchins could not pardon this attempt to convert Abyssinia without their participation, and resolved to take vengeance on the ambassador. He bore the commission of the most powerful monarch in Europe; the Pacha of Cairo and Ismael Bey had, by express orders and warm recommendations, endeavoured to secure the safety of his person; the king of Abyssinia, being apprised that Du Roule was on the journey, had informed the princes of Nubia, his allies, how much he wished to receive the ambassador: all these favourable circumstances, however, afforded but a weak protection against the machinations

thor of the memoir is too well acquainted with Herodotus, and the finall population of Ammon, not to have discovered the exaggeration of this recital; and he thought it unworthy of a single remark.

machinations of angry monks. The attendants of Du Roule could not refrain from tears at his departure; so well did they know the influence of those priests.

They persuaded the merchants that the expedition would ruin their commerce; the Mahometans, that this was an attempt to convert Nubia to christianity; the christians were told that the interests of religion were manifestly neglected; the princes of the countries through which the embassy was to pass, were alarmed for the existence of their authority; and the people at large were assured, that it was composed of sorcerers, whose errand to Ethiopia was, to stop the course of the river. All these reports were readily believed. Du Roule wrote letter after letter to the Consul of France, drew up a state of facts, and firmly rejected the advice which was given him to return. Death threatened him in every town in Nubia, and he met it at Sennaar, before the king's palace. The Frenchmen who composed his suite were massacred at the same time: he had ordered them to make no resistance.

This crime passed unpunished, which would not have been the case, if the Court of France had been as solicitous as the king of Abyssinia was, to convict the authors of it: but at that time they had other outrages to revenge.

The papers of Du Roule were lost, and those which have been quoted by Danville were written at Cairo, before that unfortunate man entered on his journey to Nubia.

Note of Citizen FOURIER.

We ſhall not ſtop to deſcribe the well known journey of Alexander, to the temple of Ammon. The ſucceſſors of that great man, the two firſt Ptolemies, whoſe glory is durable, becauſe committed to the grateful remembrance of literature and the ſciences, which they cheriſhed, rendered thoſe little countries, as well as the reſt of Egypt, happy under their wiſe adminiſtration.

Some ages afterwards, theſe iſolated cantons reſounded with theological controverſies. The ſucceſſors of Cæſar, and of Marcus Aurelius, in obedience to the decrees of the councils, baniſhed the ſectaries to the Oaſes. There Neſtorius, for many years, expiated the crime of having over much diſtinguiſhed the two natures, at the ſame time that Eutyches ſuffered for having confounded them.

The ſequeſtered ſituation of the Oaſes, which formerly could not defend them from eccleſiaſtical diſſentions, did not afford them greater ſecurity againſt the oppreſſion of the Beys, in more modern times.

The memoir of citizen Ripault contains a number of uſeful obſervations, ſupported by ſolid reaſonings. It is a critical work, written with judgment and perſpicuity, and juſtifies the choice of the Inſtitute, in appointing the author to fill the

the place of librarian. We entreat him to continue his literary researches, and, particularly, to finish the French tranſlation of Abou-l-feda,* from

* Abou-l-feda is a writer very much celebrated among the Orientals, and is even advantageouſly known in Europe, in the double capacity of geographer and hiſtorian; and he has well merited the reputation of being one of the moſt candid and accurate of the Arabian authors.

His entire name, as it ſtands in the title of his works, is *E'mad-ed-dyn Abou-l-feda Iſmael Ebn-Naſſer*; that is, *The pillar of religion, the father of redemption, Iſmael, the ſon of Naſſer*, or of *the protector*. Some authors, arranging his different names and ſirnames, in another order, write them thus; *Iſma'yl ebn A'ly el-malek el-mouyad e' mad-ed-dyn Abou-l-feda ſaheb Hamah*, that is *Iſmael the ſon of A'ly, the happy and helpful king, the ſupport of religion, Abou-l-feda, the ſovereign of Hamah*. Some give him ſtill an additional ſirname, that of *Ebn el-afdhal A'ly*.

According to the commonly received opinion, Abou-l-feda was born in the year of the Hegira 672, or in the year 1273, of the vulgar æra. He bore the title of Sultan of Hamah, a town and principality, near Damaſcus, in Syria. To Hamah he aſſigns, in his geography, 60 degrees 45 minutes of longitude, and 34 degrees 45 minutes of north latitude.

His brother Ahmed, ſirnamed *el-Malek en-Naſſer*, that is, *the Protector King*, was ſovereign of Hamah, and reigned there till the 729th year of the Hegira, being the 1328th of the vulgar æra, when he was depoſed. Abou-l-feda ſucceeded him, and on his acceſſion to the throne, aſſumed the title of *el-Malek es Saleh*; that is *the virtuous king*. But

from the Latin edition of Michaelis. We regret that we have, in this country, only one of the works

his advanced age did not permit him long to enjoy this dignity; for he died in the third year of his reign, and the ſixtieth of his age, in the year of the Hegira 732, or 1331 of the vulgar æra. Some hiſtorians aſſign him a longer life, protracting it to the 746th year of the Hegira, which anſwers to the 1345th of the vulgar æra.

Aboulfedha is the author of two conſiderable works, which are often quoted, not only by the oriental writers, but by ſuch of the Europeans as have treated of the political and geographical hiſtory of the Eaſt. The firſt of theſe, entitled *Tekouim el-bouldan*; that is, a Liſt or Table of the inhabited parts of the Earth, is an extenſive geographical treatiſe, arranged in the form of tables, as its title imports. The countries, provinces and cities, ſtand in the order of their reſpective climates, their longitudes and latitudes are annexed, and the deſcription of every place is accompanied with notes and remarks, which are often very intereſting, and which are the more valuable to us, as they afford us the means of comparing the condition of the Eaſt, in the time of Aboulfedha, with its preſent ſtate.

This work of Aboulfedha has been augmented and illuſtrated by *Mohamed ebn Aly*, ſirnamed by the Turks *Sipahy-zadeh*; that is, the ſon of a ſoldier. This writer has commented on, and explained many places, and has dedicated the work, under the title of *Ouadheh el-meçalek ela marefat el-boldan ou-el-memalek*, to Sultan Mourad-khan *(Amurath III.)* a prince who patronized learning, and cultivated it himſelf, having compoſed ſeveral works in the Arabic, Turkiſh, and Perſian languages.

The

works of that prince, who hath rendered ſuch important ſervices to the ſciences.

The *Tekouim El-boldan* of Aboulfedha muſt not be confounded with another work, under the ſame title, aſcribed to *Salhajy*, nor with another geographical treatiſe, entitled *Tekouim El-belad*, compoſed by an Arabian author, cited (under the name of *El-Balkhy*, that is, a native of Balkh, the capital of Khoraçan), by *Ebn-el-ouardy*, in the preface to his *Kheridat El-ajaib*.

The ſecond work of Aboulfedha is entitled *El-Moukhtaſſar fy ackhbar El-bachar*, or, an abridged collection of the Hiſtories of the World, and contains a ſummary of univerſal and general hiſtory, brought down to the age in which the author flouriſhed. The title of Moukhtaſſar is, not peculiar to this work, but is prefixed to a great number of other Arabic books.

The Eulogy of Aboulfedha is to be found in the *Diwan*, or, *a collection of the Miſcellaneous Works of Mohammed ebn Mohammed El-Fareky*, commonly known by the name of *Ebn Nobatah*. This collection, entitled *Souk-el-rekik*, is depoſited in the National Library at Paris, No. 1450.

Note of Citizen J. J. MARCEL.

REMARKS

On the Uſe of Oil in the Plague.

By Citizen DESGENETTES, *Chief Phyſician to the Army of the Eaſt.*

A SERIES of obſervations and reaſonings led George Baldwin, the Britiſh Conſul at Alexandria, to believe that friction of the bodies of perſons expoſed to the plague, with lukewarm oil of olives, would be not only a preſervative againſt, but an efficacious mean of removing, that malady. In order to bring his opinion to the teſt of experiment, he imparted it to Father Louis of Pavia, who had ſuperintended the hoſpital of Smyrna for ſeven and twenty years, requeſting him to make a trial of this remedy: and that prieſt obſerved that, of all the means againſt the plague, employed under his inſpection, this was the moſt uſeful.

From the trials made of this remedy, there reſulted a ſeries of directions on the manner of adminiſtering it, and of the regimen to be obſerved during the time.

It

It is not ſufficient barely to anoint the whole body with oil: it muſt alſo be ſtrongly rubbed with it; and hence the word friction has been preferred to unction.

The friction ought to be made with a clean ſponge, and a motion ſo quick, that it may be over in three minutes. It ſhould be made only once, on the day when the diſeaſe makes its appearance.

If the perſpiration be not abundant, the frictions muſt be repeated till the patient ſwims, ſo to ſpeak, in his ſweat; and neither his ſhirt nor his bed ſhould be changed, till the perſpiration ceaſe. This operation ſhould be performed in a cloſe chamber, furniſhed with a chafing-diſh full of live coals, on which ſugar or juniper-berries ought, from time to time, to be ſtrewed.

It is impoſſible to determine the time which ſhould intervene between the frictions, becauſe a ſecond friction cannot be made, till the perſpiration has entirely ceaſed; a circumſtance which depends on the conſtitution of the patient. Before each repetition of the friction with oil, the ſweat muſt be wiped from the patient's body with a warm cloth. Theſe frictions may be continued ſeveral days ſucceſſively, till a favourable change is obſerved, and then they may

be more ſlight. It is difficult to determine preciſely the quantity of oil neceſſary for each friction; but a pound ſhould certainly be ſufficient; the freſheſt and pureſt oil is to be preferred, and it ſhould be rather lukewarm than hot. The breaſt and the privities ſhould be ſlightly rubbed; and the parts which are not under friction ſhould be carefully covered, to avoid cold. If there are tumors and buboes, they ſhould be gently anointed, till they are ſufficiently ready for the application of emollient cataplaſms, to induce ſuppuration.

The perſon who performs the frictions ſhould before-hand anoint his body with oil; it is uſeleſs for him to rub himſelf; nor does it ſignify whether he anoint himſelf with more or leſs quickneſs. It will alſo be prudent for him to obſerve the ordinary precautions as to oil-ſkin or cere-cloth cloaths, wooden-ſhoes, &c. to avoid the breath of the patient, and above all, to preſerve a great deal of courage and coolneſs.

We cannot too much recommend, that the frictions be not delayed after the diſeaſe makes its appearance. The perſpirations are very much promoted by giving the patient an infuſion of the flowers of the alder-tree, without any ſugar.

As to regimen, the patient may be ſupported,

for

for the firſt four or five days, with a ſoup of vermicelli, well boiled in water alone, without ſalt. Afterwards a ſmall ſpoonful of cherries preſerved in ſugar, may be additionally given him ſix or ſeven times a day; for it is to be feared that honey would be too laxative.

When there are hopes of a cure, that is, when, after five or ſix days, the patient finds himſelf better, he may be allowed in the morning a cup of good Mocha coffee, and a ſugared biſcuit, and the number of biſcuits may be increaſed, as he recovers his ſtrength.

For fifteen or twenty days, the patient ſhould dine and ſup on rice or vermicelli, boiled in water alone, a little bread, dried raiſins and preſerved cherries, in greater plenty than before; and the quantity of bread, which ought to be of the beſt quality, may be increaſed. In ſummer, his ſoup may be made of little gourds *(courges)*, and in winter of pot-herbs, with no other ſeaſoning than a little oil of ſweet almonds. In the courſe of the day, according to the ſtate of the convaleſcent, oranges, very ripe or baked pears, or even biſcuits, may be given him, in ſuch quantity, that digeſtion may be eaſily carried on, and his appetite never wholly ſatisfied. At the end of thirty or even five-and-thirty days, his

his morning and evening repaſts may conſiſt of ſoup made of chicken, or a neck of mutton; but he ſhould not be allowed to uſe ſolid meat, before the expiration of forty days, in order to avoid indigeſtion, which is dangerous, and frequently accompanied with the return of buboes.

After the fortieth day, he may eat roaſted or boiled veal, and may take a moderate quantity of wine; but ſhould carefully avoid every thing which is of difficult digeſtion.

The following are ſome proofs of the efficacy of oil:—

In one year, in which the plague carried off a million of people in Upper and Lower Egypt, there was not a ſingle inſtance of an oil-porter being attacked with that malady:* The ſame obſervation was made at Tunis; and theſe facts firſt ſuggeſted the idea of employing oil, both as a preſervative and as a remedy.

In 1793, two-and-twenty Venetian ſailors lived on a low ſwamp, for the ſpace of five-and-twenty days, with three perſons who died of the

* The Tranſlator has been informed that, when the plague raged in London, the tallow-chandlers generally, or univerſally, eſcaped infection. The tobacconiſts are ſaid to have been equally fortunate.

plague;

plague; but unction with oil ſaved all the reſt of the party.

In the ſame year, three Armenian families, one of them conſiſting of thirteen individuals, another of eleven, and the third of nine, ſaved themſelves by the ſame means. They attended their infected parents, lay on the ſame beds, and might be ſaid to hold them inceſſantly in their arms; yet they eſcaped the contagion.

In 1794, a poor woman was ſhut up in a chamber with thirteen perſons, infected with the plague, of whom ſhe had the care, and by means of unction, ſhe preſerved herſelf from the contagion.

Two perſons belonging to a family of Raguſa, caught the infection in the laſt mentioned year. They plunged themſelves, ſo to ſpeak, into oil, and were exempted from all harm.

In ſhort this practice is at preſent approved, and generally followed at Smyrna.

In the courſe of theſe obſervations, we find ſeveral admonitions; particularly on the neceſſity of immediately adminiſtering the frictions to the infected. A delay of five or ſix days would render them wholly ineffectual.

A diarrhœa is regarded as a mortal ſymptom: the frictions however ought not to be diſcontinued

tinued on that account; for four patients, who had arrived at that dangerous criſis, were nevertheleſs cured.

The hoſpital at Smyrna received, in five years, two hundred and fifty infected patients; and it may be ſafely affirmed that every one of them, who were allowed proper time, and ſubmitted to the above treatment, obtained a cure.

An immenſe number have been preſerved from contagion by unction, aſſiſted by temperance.

The little work, of which the preſent is an abſtract, is concluded by the favourable atteſtations of the Conſuls of England, and the empire, at Smyrna; and a number of teſtimonies of perſons in public employments, and of reſpectable individuals, who have endeavoured to extend this method of treatment into every country intereſted in it.

We have omitted nothing eſſential, and diſregarding all theory, we only preſent facts, already ſupported by numerous teſtimonies, and which we ſubmit anew to the teſt of experiment.

REPORT

REPORT

Of the Obſervations made to determine the Geographical Poſition of Alexandria, and the Direction of the Magnetic Needle,

By Citizen NOUET.

I CARRIED with me from Paris an aſtronomical circle, with two moveable teleſcopes, and a marine watch made by Louis Berthoud. Citizen Quenot was furniſhed with a circle of reflection* and a marine watch. We diſtinguiſhed

* The circle of reflection here mentioned, if divided into reflected degrees, to anſwer as a double ſextant, is the invention of that excellent mathematician, Captain P. R. Nugent, for which he took out a patent in London, ſeven years ago. But the invention having been pirated by the man employed to divide the arch, it was carried abroad in a redundant and imperfect ſtate, and uſed in the cumbrous form of a circle. The Tranſlator, however, has ſeen a compleat one in poſſeſſion of Mr. A. Tilloch. Its radius is ten inches, and it has a reflected croſs artificial horizon, by which altitudes can at all times be correctly taken on ſhore, and alſo at ſea in bad weather. About two years ago, Captain Nugent alſo lodged in the Enrolment-office, an extenſive

ed the two watches, calling the firſt No. 34, and the ſecond No. 19. Before my departure, I had occaſion to regulate the movement of No. 34, for about fifteen days, by comparing it every day at noon, with the pendulum clock of the marine obſervatory, and thence deducing its diurnal acceleration of 12″, mean time.

During the journey, I could not keep this watch ſuſpended in its box; I carried it in a waiſtcoat pocket, in a poſition always vertical, and with the point of noon uppermoſt, as the maker had adviſed me. We took Marſeilles in our way, in order to regulate the movement of our watches, at the marine obſervatory of that city; and, having compared them, on the 15th of Floreal, with the pendulum clock in the obſervatory, the movement of No. 19 was found to be very little altered; but No. 34 had gained, ſince our departure from Paris, 2″ of diurnal acceleration: whence I concluded that this watch would be uſeleſs in journies by land.

tenſive ſpecification of ſome new, and improved, aſtronomical and magnetical inſtruments, among which were variation and dipping compaſſes and needles, of preciſely the ſame conſtruction with thoſe afterwards mentioned in this report, and ſeveral which poſſeſs eſſential advantages incompatible with thoſe conſtructions.—*Tranſlator.*

Having

Having reached Toulon, I put my watch, No. 34, in its box or caſe, and, during our ſhort ſtay in that town, and on the road, we made obſervations to determine anew the movement of this watch; and we found that, from the 18th to the 27th of Floreal, its movement had returned to 10″ of acceleration.

On the 27th Prairial, we had a very favourable opportunity of regulating our watches, at the obſervatory of Malta. During our paſſage from Toulon to that iſland, No. 34 had a daily acceleration of 11″,5, and No. 19 of 5″,7, being pretty nearly their ordinary movement.

On the 14th of Meſſidor, at the anchorage near the tower of Marabou (Marabouth) citizen Quenot, from the abſolute altitudes of the ſun taken with his circle, found, by his watch, the longitude of Alexandria to be $1^h\ 50'\ 17''$. This obſervation, compared with No. 34, gave, for the longitude of Alexandria $1^h\ 50'\ 56''$, allowing for the daily acceleration of $11''\frac{1}{2}$ found at Malta. But this watch was probably influenced by the temperature, as the ſubſequent obſervations proved. For, in the firſt days of Thermidor, we had obtained, by obſervations daily made on ſhore, 7″,5 of diurnal acceleration; but at Malta we had 11″,5: taking therefore the mean of the

two

two results, we had $9''\frac{1}{2}$ of advance upon the mean time. If we multiply $9'',5$ by 27, the days intervening between the 27th Prairial and the 14th of Meſſidor, we ſhall have $2'\ 41'',5$, inſtead of $3'\ 15'',5$ employed above. With this new acceleration we found, by No. 34, for the longitude of the anchoring place, $1^h\ 49'\ 40''$ the diſtance of the Aquillon from the tower of Marabou, being eſtimated at 6000 metres.

The Pharos was 50 degrees to the ſouth-eaſt of us, and the diſtance from the anchoring place to the meridian of the Pharos, according to the plan of Alexandria, was 14,600 metres. This diſtance, reduced into longitude, for the latitude of $31^\circ\ 12'$, gives $38''$ in time, for the difference of meridians between the anchorage and the Pharos. But, by No. 34, we found the longitude of the anchoring place of the Aquillon, $1^h\ 49'\ 40''$. If to this we add $38''$, becauſe we were ſituated to the weſtward, we ſhall have, for the longitude of the Pharos of

Alexandria, - - $1^h\ 50'\ 18''$

By No. 19 we found it $1\ 50\ 17$

Citizen Quenot, from 42 obſervations of the eaſtern and weſtern diſtances of the moon from the ſun, in which the errors of the theory ought to balance each other, found the longitude of

Alexandria

Alexandria to be $1^h\ 50'\ 20''$. Thus the three different reſults vary only $3''$, and conſequently appear to merit confidence.

Let us now ſee what reſults were afforded by the celeſtial phœnomena.

On the 24th of Meſſidor, the immerſion of the firſt ſatellite of Jupiter, gave, for the difference of meridians, $1^h\ 50'\ 56''$.

On the 8th of Thermidor, the immerſion of Jupiter's ſecond ſatellite, gave, for the difference of meridians, $1^h\ 50'\ 23''$. Slight clouds were paſſing during the obſervation.

Idem. The emerſion of the ſecond ſatellite of Jupiter, gives, for the difference of meridians, $1^h\ 51'\ 18''$. The path of the Satellite was near the edge of Jupiter's diſk.

On the 20th Thermidor, the immerſion of Jupiter's third ſatellite, gave, for the difference of meridians, $1^h\ 51'\ 7''$.

On the 3d Fructidor, there was an immerſion of the ſecond ſatellite of Jupiter; but it was not diſtinctly perceived, by reaſon of a ſmall cloud: the obſervation is therefore doubtful.

Idem. The immerſion of the firſt ſatellite of Jupiter, gave, for the difference of meridians, $1^h\ 50'\ 44''$.

On the 10th Fructidor, the immerſion of the

first satellite of Jupiter, gave, for the difference of meridians, $1^h\ 50'\ 17''$. Jupiter was near the zenith, the instrument could scarcely reach it, and the image of the object was formed on the edge of the field of the telescope.

On the 15th Fructidor, there was an immersion of the second satellite of Jupiter, which gave, for the difference of meridians, $1^h\ 51'\ 4''$. The wind shook the telescope.

Among all these observations, we chose the four following, viz.

The 24th Messidor, which gives	$1^h\ 50'\ 56''$
The 8th Thermidor, which gives	1 50 23
The 8d Fructidor, which gives	1 50 40
The 15th Fructidor, which gives	1 51 4
The mean of all -	1 50 46

These observations, to merit confidence, should be confirmed by corresponding ones, made in observatories, whose geographical position is well established, and the error of the theory thence deduced. But we may, for the present, look upon the determination of the longitude of Alexandria, deduced from the motion of marine time-pieces, and the obscured distances of the moon from the sun, as exact.

The

The 3d Fructidor afforded us a decisive observation, for fixing the geographical position of Alexandria, by means of an occultation of the star ϕ of Sagittarius, by the body of the moon; but, for once, the sky was so entirely obscured by clouds, as to deprive us of the benefit of this phœnomenon. At half past nine o'clock, the clouds were dissipated, and we endeavoured to observe the immersion; but, as we were ignorant of the instant of immersion, we sat down too soon at the telescope. After continuing our observation half an hour, I traced the whole limb of the moon, to see if the star had not escaped us, and, at the moment when I returned to the point which I had watched so long, I perceived that the emersion had already taken place about 6″ of time. This observation being uncertain, I made no use of it.

To determine the latitude of Alexandria, we made use of a quadrant of 13 inches radius, constructed by citizen Lenoir, maker of astronomical instruments. There was adapted to the moveable telescope a metal mirror, to reflect the image of the object perpendicularly to the axis of the telescope, a construction which is necessary in climates where the sun approaches the zenith.

The results which we obtained were nine in number, viz.

31°	11′	54″	In these observations allowance was made for half the thickness of the thread . . . — 15″ For refraction . . . — 18″ For the error of the telescope . . . + 2′ 0″
	11	57	
	12	6	
	12	11	
	12	12	
	12	20	
	12	28	
	12	28	
	12	32	
	110	8	
13°	12′	14″	

This latitude was observed on the terrace of the Batavian Consul; but, according to the plan of Alexandria, the distance of this place of observation from the perpendicular axis of the Pharos, is 1583 metres, which, reduced to parts of the meridian, gives 51″, to be added to 31° 12′ 14″, in order to obtain the latitude of the Pharos 31° 13′ 5″.

The

The Variation and Dip of the Magnetic Needle, obſerved at the Flag-ſtaff of the Commandant of Engineers.

Theſe obſervations were preceded by ſome preliminary ones, to determine the direction of a point of the horizon, in reſpect of the north and ſouth points of the world. We gave the preference to the Pharos, becauſe it was our ſtandard for regulating the triangles which adjuſt the principal points of the plan of Alexandria.

On the 21ſt, 22d, and 23d of Thermidor, we obſerved, with the aſtronomical circle, eight azimuthal differences between the Pharos and the centre of the ſun. Some inſtants after ſun-riſe, theſe differences of azimuth, each compoſed of two conjoined angles reduced to the horizon, gave the angles at the zenith, between the verticals of the Pharos and the Sun, which being combined with the azimuths of the ſun, calculated for the ſame inſtant, gave, for the azimuth of the Pharos, the eight following reſults:-

12°	59′	52″	West.
13	0	12	
12	58	31	
12	58	14	
13	2	20	
12	59	6	
12	59	6	
12	59	6	

The mean, 12° 59′ 33″ West.

The compaſs which we uſed was 21 centimetres in diameter, carrying on its centre a needle in the form of a parallelogram, 18 centimetres and a half in length, armed in the middle with a cap of agate, moveable on two pivots, to adjuſt the needle by vibration.

This compaſs was concentric to a circle, in which it moved like an index; and, by means of a Vernier, indicated on the circle the different ſucceſſive arches which it deſcribed. To multiply obſervations, on the different points of the circumference of the exterior circle, the zero of the compaſs was made to coincide with the index of the needle, at the ſame time that the Vernier of the compaſs coincided with the zero of the exterior circle; the compaſs was then moved (the exterior circle remaining fixed) till its

its zero corresponded with the object, in the horizon, whose azimuth was known. This correspondence was indicated by a meridian telescope, which moved in the meridian of the compass, adjusted by vibration.

We determined the difference of azimuth, between the Pharos and the little Pharos *(Pharillon)* in order to obtain the azimuth of the latter, from which we deduced the variation of the needle. If we had made the Pharos our object, it would only have given us an angle of 6′ and a half with the direction of the needle.

There is annexed a table of multiple observations, made on two immediately succeeding days; and we have carried them to two compleat revolutions of the exterior circle, in order to correct the errors unavoidable in dividing instruments of so small a radius.

The first column contains the arches of the difference of azimuth indicated on the interior circle of the compass. All the arches are reckoned from the zero point of the compass, and are always indicated by the same portion of the circumference. Thus the variations observable in them arise partly from the *inertia* of the needle, or from the friction on its pivot.

The second column contains the multiple an-

gles given on the exterior circle, and the third column exhibits the quotients of the angles of the ſecond, divided by the number of obſervations. The firſt day affords us for the ultimate reſult, 55° 56′½ between the *Pharillon* and the direction of the needle; the ſecond day gives us 55° 57′; but the azimuth of the *Pharillon* has been found to be 42° 51′ north-eaſt; therefore the variation of the compaſs is 13° 6′ weſt.

Obſervations on the Dipping Needle, and on the Time which it takes to deſcribe given Arches, in Proportion to the local Force of Magnetiſm which affects it.

Theſe obſervations were made with a dipping compaſs, conſiſting of a vertical circle, moveable in an azimuthal one, and carrying on its centre a round needle, ending in two points. It was 16 centimetres and a half in length, and moved in the plain of the vertical circle, by means of two pivots which reſted on two edges of agate.

To give the needle a great motion, the vertical circle which ſupports it muſt be carried about 90° to the right and to the left of the magnetic meridian, and immediately brought under

under the meridian indicated by the antecedent obſervations on the azimuthal circle.

I began to count when the oſcillations reached no farther than the zero of the vertical circle, which is the zero of the dip, and which gave 46 or 47 degrees for the half of the greateſt arches deſcribed, and every fifth time that the needle ſtopped on the right, or was at the zero of the dip, the time employed, and the degree which the needle had reached, were marked. This proceſs was continued every fifth time, to the point neareſt the point of reſt, which gave at each trial, the angle of the dip. We made our experiments with the face of the limb turned towards the eaſt, and then towards the weſt, in order to correct the error of the zero point with the true horizon. I ſubjoin two tables of theſe obſervations. Each is compoſed of ſix columns, which repreſent ſix different experiments, in order to obtain the mean of their reſults. Every column is divided into four other columns; the firſt indicates the minute and ſecond of each obſervation; the ſecond column, which contains the differences of the times of the firſt column, gives the number of ſeconds which elapſed during each obſervation; the third includes, in degrees, the limit of every twelfth oſcillation; and

and the fourth column exhibits the magnitude of the half arches deſcribed in every ten oſcillations.

We ſee that the greateſt arches were deſcribed in 28″; the mean in 31 and 32″, and the leaſt in 25″. This table wants the ſupport of correſponding experiments, made in different climates, to obtain the refults of the force of magnétiſm. The dip of the needle is noted at the foot of each column. A difference will be obſerved in the two tables: the firſt gives the dip 46° 10′, with the face of the limb preſented to the eaſt, and the ſecond 48° 50′, the face of the limb being directed towards the weſt. The half of this difference is owing to the error of the zero point with the true horizon, indicated by a level, fixed upon a glaſs-caſe, which defends the needle from the agitations of the atmoſphere. Hence the reaſon why the obſervations are made to correſpond. The mean of them gives the dip of the needle 47° 30′ beneath the northern part of the horizon.

I was adviſed, and it was my wiſh, to make ſimilar obſervations on the oſcillation of the variation needle; but the manner of its ſuſpenſion with a cap does not allow it to make a number

of

of horizontal oſcillations, to repeat the obſervations twice. There is ſcarcely any other compaſs than that of citizen Coulomb, in which the needle is ſuſpended by a thread, from which we can expect ſatisfactory reſults.

Observations on the Variation of the Compass at Alexandria.

Simple interior arches.	Multiple exterior arches.	Simple angles deduced.	Simple interior arches.	Multiple exterior arches.	Simple angles deduced.
56° 5′	56° 0′	56° 0′	55°58′	55°58′	55°58′
55 50	111 50	55 55	56 0	111 55	55 57
55 30	167 18	55 44	55 30	167 4	55 41
55 15	222 28	55 37	55 37	222 15	55 34
55 45	278 15	55 39	55 55	278 13	55 39
55 30	333 45	55 38	55 45	333 48	35 38
55 45	389 40	55 40	55 45	389 45	55 41
55 15	445 52	55 44	56 12	445 55	55 44
56 0	501 48	55 44	55 45	501 48	55 45
56 20	558 0	55 48	56 30	558 5	55 48
56 30	614 30	55 52	56 30	614 30	55 53
56 5	670 25	55 52′	56 10	670 35	55 53
56 45	727 15	55 56,5	56 45	727 20	55 57

Note. In order to compensate the errors of division, the observations were continued to 727 degrees, which complete two circumferences.

Last result of the multiple angles between the direction of the needle and the Pharillon 55° 57′

Azimuth of the Pharillon - - - 42 51 N.E.

Difference, or variation of the compass 13 6 W.

Observations on the Dipping Compaſs, the Face of the Limb being towards the Eaſt.

Times obſerved.	Differences.	Limits of oſcill.	Arches deſcribed.	Time obſerved.	Differences.	Limits of oſcill.	Arches deſcribed.
55′ 2″		0°	46°	7′ 8″		0°	46°
	28″				29″		
30		8	38	37	28	8	38
	29						
59,5		13	33	8 5	28	12	34
	28						
56 27		17	29	33	28	17	29
	28						
55		21	25	9 1	28	20	26
	28						
57 23		25	21	29	28	23	23
	28						
51,5		27	19	57	30	26	20
	30						
58 21		30	16	10 27	29	29	17
	31						
52		32	14	56	31	31	15
	31						
59 23		34	12	11 27	30	33	13
	31,5						
54,5		36	10	57	31	35	11
	31,5						
0 26		38	8	12 28	30	37	9
	31						
57		40	6	58	30	38	8
	30						
1 27		41	5	13 28	29	40	6
	30						
57		42	4	57	29	41	5
	30						
2 27		43	3	14 26	27	42	4
	27						
54		43,5	2,5	53	27	43	3
	26						
3 20		44,5	1,5	15 20	24	44	2
	25						
45		45	1	44	22	44,5	1,5
	23						
4 8		45,3	0,7	16 6	22	44,7	0,8
Reſt.		46		28	19	45	
				15 47		46,3	
				Reſt.		46,5	

Times observed.	Differences.	Limits of oscill.	Arches described.	Times observed.	Differences.	Limits of oscill.	Arches described.
24′ 14″		1°	46°	39′ 43″		0°	46°
43	29″	8	39	40 12	29″	7½	39
25 11	28	13	34	39	27	13	33
40	29	17	30	41 7	28	17	29
26 7	27	21	26	35	28	21	25
35	28	24	23	42 3	28	24	22
27 3	28	27	20	31	28	27	19
32	29	30	17	43 0	29	29	18
28 2	30	32	15	30	30	31	15
32	30	33	14	44 2	32	33	13
29 2	30	35	12	33	31	35	11
35	33	37	10	45 3	30	37	9
30 5	30	39	8	33	30	38	8
35	30	40	7	46 3	30	40	6
31 5	30	41	6	32	29	41	5
34	29	43	4	47 1	29	42	4
32 3	29	43,5	3,5	29	28	43	3
30	27	44	3	57	28	43½	2,5
56	26	45	2	48 23	26	44	2
33 21	25	46	1	48	25	45	1
48	27	46,5	0,5	49 11	23	45,0	1
Rest.		47		32	21	45,5	
				53	21	45,7	
				Rest.		46,3	

Times observed.	Differences.	Limits of oscill.	Arches described.	Times observed.	Differences.	Limits of oscill.	Arches described.
57′ 53″		1°	45°	9′ 34″		1°	45°
58 22	29″	7½	39	10 3	29″	7½	39
51	29	13	33	32	29	13	33
59 18	27	17	29	11 0	28	17	29
45	27	20	26	11 28	28	20	26
0 14	29	23	23	55	27	24	22
42	28	26	20	12 24	29	26	20
1 11	29	29	17	53	29	29	17
41	30	31	15	13 23	30	31	15
2 12	31	33	13	53	30	33	13
42	30	35	11	14 24	31	35	11
3 14	32	36	10	55	31	37	9
43	29	38	8	15 25	39	38	8
4 12	29	39½	7	5	28	39	7
41	29	40½	6	16 20	27	41	5
5 8	27	42	4	47	27	41½	4,5
34	26	42½	3,5	17 13	26	42	4
59	25	43	3	39	26	43	3
6 23	24	44	2	18 4	25	43,7	2,3
44	21	44,5	1,5	29	25	44,3	1,7
7 5	21	45	1	55	26	45	1,0
23	18	45,3	0,7	19 20	27	45,3	0,7
42	19	45,7	0,3	52	30	45,5	0,5
Rest.		46		Rest.		40	

Continuation of Observations on the Dipping Compass, the Face of the Limb being turned towards the West.

Times observed.	Differences.	Limits of oſcill.	Half-arches deſcribed.	Times observed.	Differences.	Limits of oſcill.	Half-arches deſcribed.
7′ 20″		0°	49°	18′ 6″		0°	48°
49	29″	7	42	35	29″	7	41
8 17	28	13	36	19 3	28	13	35
45	28	17	32	30	27	17	31
2	27	20	29	58	28	22	27
40	28	24	25	20 26	28	24	24
10 8	28	26	23	56	30	27	21
36	28	29	20	21 26	30	29	19
11 6	30	31	18	56	30	33	16
37	31	33	16	22 27	31	35	13
12 9	32	35	14	58	31	37	11
36	27	41	8	23 29	31	39	9
13 3	27	42,5	6,2	24 0	31	40,5	8
30	27	44	5	32	32	42,5	6
57	27	45	4	25 2	30	44	4
14 21	24	46	3	29	27	45,3	3
41	20	47	2	56	27	46,3	2
58	17	47,5	1,5	26 19	23	47,3	1
15 13	15	47,7	1,0	42	23	47,7	0,7
Reſt.		48,7		27 15	23	48	0,5
				Reſt.		48,5	

Times observed.	Differences.	Limits of oscill.	Half-arches described.	Times observed.	Differences.	Limits of oscill.	Half-arches described.
52′ 49″		0°	48°	2′ 17″		0°	49°
53 18	29″	7	41	46	29″	6,5	42,8
57	29	15	33	3 14	28	11	38
54 24	27	19	29	41	28	15,5	34
52	28	23	25	4 10	28	19	30
55 21	29	27	21	38	28	22,5	27
50	29	30	18	5 6	28	25,5	24
56 19	29	32	16	34	28	28	21
47	28	34	14	6 4	30	31	18
57 15	28	36	12	34	30	34	15
42	27	37,5	11,5	7 3	29	37	12
58 8	26	39	9	33	30	39	10
34	26	40,5	7,2	8 0	27	41	8
58	24	43	4,7	27	27	43½	6
59 21	23	45,7	2	55	28	45	4
44	23	46,5	1,2	9 23	28	46,	3
0 8	24	47	0,7	51	28	47	2
Reft.		47,7		10 15	24	48	1
				37	22	48,3	1
				Reft.		49,3	

Times observed.	Differences.	Limits of oscill.	Half-arches described	Times observed.	Differences.	Limits of oscill.	Half-arches described.
13′ 28″		1°	48°	24′ 19″		0°	49,° 3
	29″				29″		
14 17		7,7	40,3	48		6,5	428
	28				28		
45		13,3	35	25 16		14	35,3
	27				28		
15 12		17½	30,5	44		16	33,3
	29				28		
41		21	27	26 12		19,5	29,8
	28				28		
16 9		23,7	24	40		23	26,3
	29				29		
38		27	21	27 9		26,5	22,8
	29				30		
17 7		29,5	18,5	39		28	21,3
	31				30		
38		31,7	16,3	28 9		30,5	18,8
	31				31		
18 19		34	14	40		32,7	16,6
	31				31		
40		36,3	11,7	29 11		35	14,3
	32				31		
19 12		38,3	9,7	42		37	12,3
	32				29		
44		40	8	30 11		39	10,3
	32				29		
20 16		41,5	6,8	40		40,5	8,8
	31				28		
47		43	5,3	31 8		42	6,3
	30				28		
21 17		43,7	4,6	36		43,3	6
	30				26		
48		44,5	3,8	32 2		44,3	5
	30				26		
22 18		46,7	1,6	28		45,3	4
	22				25		
40		47,3	1	53		46	3,3
	21				24		
23 1		47,7	0,6	33 17		47	2,3
	20				24		
21		48	0,3	41		47,5	1,8
					23		
Rest.		48,3		34 4		48	1,3
				Rest.		49,3	

The firſt column marks the time at which each tenth oſcillation ended.

The ſecond column expreſſes the time employed in making ten oſcillations.

The third column marks the limit or term of every tenth oſcillation.

The fourth column contains the magnitudes of the half arches deſcribed in every ten oſcillations.

The dip deduced from the laſt reſults of every column, the face of the limb being,

Towards the Eaſt.	Towards the Weſt.
46° 0′	48° 45′
46 30	48 30
46 15	49 20
46 0	48 15
46 10	49 20
46 10	48 50
48 50	

Mean, 47° 30′

Analyſis of the Slime of the Nile,

By Citizen REGNAULT.

THE influence of the ſlime, or mud, of the Nile, and its uſes in the arts, have induced me to ſubject it to chemical analyſis.

After the annual inundation, the ſoil of Egypt is covered with a ſtratum of ſlime more or leſs thick. Its colour, at firſt black, is changed by the deſiccation of the air, into a yellowiſh brown. It then cracks, and preſents fractures, which ſhew that the ſlime has been depoſited in horizontal layers, the ordinary diſpoſition of clay, of which it poſſeſſes the other characters. It has a ſtrong affinity for water, and ſuffers contraction in the fire.

On waſhing the ſlime, only a ſmall quantity of ſalts is obtained; for 100 parts of ſlime contain but 1'2. Theſe ſalts are compoſed of muriate of ſoda, ſulphate of ſoda, and carbonate of ammoniac.

The ſlime dried in the air, and finely pulverized, yields by diſtillation, carbonic acid and water, the laſt in the proportion of 11 parts in 100. It then puts on a black colour; but if, in this

this ſtate, it be heated in a crucible, in contact with the air, it becomes red, and loſes the eleventh part of its weight. Preſuming that this loſs of weight, joined to the change of colour, was owing to the combuſtion of the carbonic part, I diſtilled the ſlime with nitrate of pot-aſh; and the quantity of carbonic acid diſengaged by this operation, left me not a doubt of the exiſtence of carbon in the proportion indicated.

The ſlime ſubjected to theſe operations, was taken up at the diſtance of 500 toiſes (fathoms) from the Nile, in a canal ſerving to conduct the waters of the inundation; it was dried in the air.

One hundred parts by weight, of this ſlime, heated in a ſilver crucible, with 300 parts or cauſtic pot-aſh, yielded a green maſs, which was almoſt entirely diſſolved by the muriatic acid. Some white flakes remained in the liquor, from which four grains of ſilex were ſeparated by filtration.

The muriatic ſolution, being divided into two equal parts, the one was decompoſed by ammoniac, and the other by carbonate of pot-aſh.

The precipitate formed by the ammoniac was compoſed of alumine and iron. There could be

no magneſia in it; for the muriatic ſolution held an exceſs of acid, and this exceſs, in uniting itſelf with the alkali, had formed muriate of ammoniac, which had given, with the muriate of magneſia, a triple ſalt not decompoſable by a greater quantity of the ſame alkali. To ſeparate the iron from the alumine, I diſſolved this earth in a ſolution of cauſtic pot-aſh; and, on doubling the quantities, found,

Oxyd of iron 6 parts,
Alumine—48.

Before decompoſing the other portion of the ſolution of ſlime, it was deprived of the exceſs of acid. The precipitate obtained by the carbonate of pot-aſh was expoſed to a ſtrong heat in a crucible *(tet à rotir)* in order to oxydate the iron, and to prevent it, as well as the alumine, from being affected by the acetous acid. This acid, kept in digeſtion on the precipitate, formed, with the lime of the magneſia, ſalts which, when ſeparated and converted into carbonates, gave, by doubling the quantities,

Carbonate of lime——18 parts,
Carbonate of magneſia 4.

Thus, in 100 parts, the ſlime of the Nile contains

11 of

11 of water,
9 of carbon,
6 of oxyd of iron,
4 of ſilex,
4 of carbonate of magneſia,
18 of carbonate of lime,
48 of alumine.

Total 100 parts.

It muſt be obſerved, that the quantities of ſilex and alumine vary, according to the places where the ſlime is taken up. On the banks of the Nile, the ſlime contains a great quantity of ſand, and as it is carried by the waters of the inundation, to diſtant grounds, it loſes a portion of ſand proportionable to its diſtance from the river; ſo that, when this diſtance is conſiderable, the argil is found almoſt pure; and thus the ſoil of Egypt preſents clay in the different ſtates of purity required in the arts.

We find, in the ſlime of the Nile, the principles which promote vegetation. The cultivators of the ſoil look upon it as a ſufficient manure; and ſo much are they convinced of this, that, when the land ſtands in need of manure, they cover it with the ſlime of the Nile, reſerving their ſtable dung for other purpoſes: for exam-

ple, they dry it, and burn it inſtead of fire-wood, which is ſcarce in Egypt.

Proſper Alpinus juſtifies this opinion; for, when ſpeaking of the ſlime, he ſays, *Agri ita pinguefiunt, ut ſtercoratione non egeant.* (The land is ſo rich, that it requires no dung.) We adopt the ſame opinion; for if the ſlow progreſs of vegetation, obſervable in ſome parts of Egypt, were to be urged as an objection againſt it, we might fairly aſk, Whether that ſlow progreſs ſhould be aſcribed to the want of manure, or of proper culture?

The ſlime of the Nile is employed in ſeveral arts Excellent bricks, and vaſes of different forms, are made of it. The ſame material enters into the compoſition of pipes. Glaſs-makers uſe it in conſtructing their furnaces, and the country people cover their houſes with it. We hope that, when the qualities of the ſlime come to be better known, it will be applied to more valuable purpoſes, ſuch as delft-ware and porcelain; and theſe arts, if introduced into Egypt, would contribute to the proſperity of the new colony.

Remarks

Remarks on the Management and Produce of the Land, in the Province of Damietta,

By Citizen GIRARD.

THE rice of the province of Damietta, being in more eſtimation than that of any other part of Egypt, I thought I ſhould be uſefully employed, during my ſtay, in collecting all the information I could procure, on the management of the land proper for the cultivation of that grain, and on the commerce carried on in it, to Syria, and the other countries of the Eaſt.

To arrive at reſults rigorouſly exact, in the reſearches which I propoſed to make, would have required the experience of ſeveral years; conſequently I can only preſent theſe remarks as the firſt ſketch of a more perfect work, which time alone can furniſh the means of executing.

It will be proper, in the firſt place, to ſettle the proportion of the meaſures of ſuperficies and capacity, uſed in the province of Damietta, to our own correſponding meaſures.

The cultivators commonly meaſure their lands by the number of wheels neceſſary to raiſe the water

water deſigned to irrigate them, or by the number of days employed in cultivating them. But this way of meaſuring, having nothing determinate, is not admitted into the public acts.

The ſtandard or root *(unité)* of ſuperficial meaſure is called a *fedan*, which is a ſurface of 432 ſquare rods *(cannes)*. The rod is 3 metres, 99 centimetres in length. Thus the fedan is equivalent to 6877 ſquare metres, 48 centimetres, which makes two *arpents* and one-hundredth, Paris meaſure *.

In general all dry grain is weighed. The *okka*, which is the ſtandard of the weight, appears to be variable, in different diviſions of Egypt At Damietta, it conſiſts of 400 drachms, which make two pounds and a half avoirdupois.

But for weighing thoſe kinds of grain which are moſt conſumed, ſuch as rice, wheat, barley and

* The metre (from *metron*, the Greek word for meaſure) is 36 inches, 11,296 lines, and the centimetre and the millimetre, one-hundredth and one-thouſandth of the metre, reſpectively, as their names import. See De la Lande's Hiſtory of Aſtronomy for 1799, in Tilloch's Philoſophical Magazine. The Paris *arpent* contains 100 ſquare perches, each perch 18 feet. The fedan appears to be to the Engliſh acre as 74 to 43, in round numbers. Thoſe who would make the calculation with nicety, muſt obſerve that the French foot is to the Engliſh as 1068 to 1000. *Tranſlator.*

maize

maize (or Indian corn), they uſe a more conſiderable weight, called *ardeb*, which is equivalent to 225 okkas, or to 578 pounds, and twenty-three hundredths.

By a very remarkable practice, for which it is difficult to account, the weight of rice, before it is freed from its huſks, is not eſtimated in ardebs, as it is after being cleanſed and ready for the market, but by a weight of another ſtandard, called *dareb*, which is equivalent to 448 okkas, or 1131 pounds and forty-two-hundredths.

Beſides, the meaſures which we have been deſcribing, vary in the different cantons of Egypt; and the uniformity to which we can now reduce them, is a benefit of which it is to be wiſhed we could procure the immediate enjoyment, to that country.

The land in the province of Damietta is in general proper for the culture of rice. The ſituation of this province, at the efflux of the Nile, renders its irrigation the more eaſy, as the level of the ſoil is leſs elevated above the waters of the river, and as this level only varies about a metre and a half. It is to be obſerved, however, that all the lands are not equally elevated. It is not uncommon to ſee a field higher, by a foot or 18 inches, than thoſe by which it is ſurrounded.

This

This height, which cannot be attributed to the ſucceſſive depoſitions of the Nile, ariſes from the ſlime being annually taken out of the neighbouring canals and ditches, and uniformly ſpread on the ſurface of the lands now ſpoken of. Whatever be the cauſe of this difference of elevation, their culture is not altogether the ſame with that of the low lands; for, as ſoon as the rice is gathered in, they ſow on the latter the trefoil, known by the name of Egyptian trefoil, while the former are commonly ſowed with wheat.

As the culture of rice, on the more elevated lands, requires conſiderable expence in irrigation, individuals who cannot afford that expence, ſubſtitute for it a crop of maize, which requires to be watered only five or ſix times during its growth.

To theſe different articles of culture, muſt be added ſugar canes, and ſeveral kinds of pulſe, to which they allot ſome portions of land in the neighbourhood of Damietta; but it is difficult to eſtimate the value of ſuch produce, becauſe it depends wholly on the induſtry of the cultivator, and of the more or leſs conſiderable advances, which he is in a condition to make.

Although the northern extremity of the Delta appears to be the leaſt proper part of Egypt, for the

the production of the ſugar cane, yet it has been cultivated there with abundant ſucceſs. There were at Damietta three works in which molaſſes were made; but the waters of the ſea having aſcended in the Nile, above the village of Fareſcour, irrigation could only be performed with brackiſh water, which deſtroyed vegetation, and which, impregnating the ſoil with too much ſalt, reduced into a ſtate of comparative ſterility, the fields which were moiſtened with it. This calamity, which the province of Damietta long laboured under, only ceaſed three years ago. On the cauſe which produced it, there is but one opinion. The canal of Menouf, which branches off from the Nile, near the village of Matarieh, having been conſiderably enlarged, the waters of the Nile ran into it; and, after traverſing the Delta, diſcharged themſelves into the weſtern ſtream of that river. This derivation ſo much reduced the branch of Damietta, and the velocity of the waters which continued to flow in it was ſo much diminiſhed, that, except above Fareſcour, they could not preſerve an equilibrium with the waters of the ſea, which the reflux and the north wind tended to drive into the bed of the Nile.

The canal of Menouf having been ſtopped up by a dyke, or bank, the waters have reſumed their

their former courſe, in the eaſtern branch of the river, and now the ſalt water does not even reach Leſbeh.

In order to give determinate ideas on the ſubject, I ſhall reduce the information which I have collected, to a certain number of fedans; and, as the expences of the cultivator are much the greateſt, in proportion to his profits, on a ſmall piece of land, I ſhall take ten fedans * for the term of compariſon.

The expences neceſſary for the cultivation of ſuch a tract of ground are,

1ſt. The intereſt of the ſums advanced for the purchaſe of cattle and implements of huſbandry, to which muſt be added the annual chance of loſs of cattle.

2dly. The purchaſe and maintenance of cattle.

3dly. The purchaſe and wear and tear of machinery and inſtruments of huſbandry.

4thly. The wages and ſalaries of the labourers employed.

5thly, and laſtly, The purchaſe of ſeed.

The intereſt of money, as is well known, is more or leſs conſiderable in proportion as the commodity is more or leſs ſcarce; and, what is

* Somewhat above 17 Engliſh acres. *Tranſlator.*

of

of ſtill more conſequence, in proportion as the property of its poſſeſſor is leſs or more ſecure. Theſe two cauſes have probably concurred in Egypt, to raiſe intereſt to the rate of ten per cent. The gain of lenders here, as every where elſe, has no other limits than the neceſſities, more or leſs preſſing, of borrowers; but in general the intereſt of money is looked upon as uſurious, when carried beyond a tenth part of the loan.

For the cultivation of ten fedans, it is common to employ twelve oxen, the mean price of which is 720 *pataques*.

	Pataques.
The annual intereſt of this ſum is	72
The irrigation of ten fedans requires three wheels to raiſe the water. Theſe machines, the price of which varies with their magnitude, will coſt at a medium, 90 pataques.	
On account of their careleſs conſtruction, they muſt be renewed every five years, by which dividing the value of the machines, we have for their annual expence —	18
To this muſt be added the intereſt of their coſts — — —	9
The chief inſtruments of huſbandry, conſiſting	
Carry over	99

	Pataques.
Brought over	90
siſting of two ploughs and a machine to beat the rice, are worth, in the whole, 30 pataques, the annual intereſt of which is	3
Their wear and tear may be valued at the ſame ſum of — —	3
As the cultivators in the vicinity of Damietta raiſe no cattle, the chances of their ſickneſs and mortality are not balanced by any preſumed benefits. Theſe chances may be eſtimated at one-twelfth part of the number of oxen employed, which, for the cultivation of ten ſedans is — —	60
The oxen are fed, for four months, on beans and cut ſtraw.	
The value of the ſtraw, in common years, is — — —	75
That of the beans is — —	100
During five other months, the oxen are fed with green trefoil, valued at —	200
During the three remaining months, they are fed with dried trefoil, the produce of 9 ſedans of land, and which, at the rate of 12 pataques per ſedan, produces an expence of	108
Two	
Carry over	648

	Pataques.
Brought over	648
Two men to take care of the cattle, paid each at the rate of 300 *paras* the month coſt annually — — —	80
Three other men, alſo employed, during the whole year, in working the machines for raiſing the water, and in other day labour. They are paid 9 paras per day, making yearly, for the three — —	108
The cultivators employ beſides, an overſeer to whom they commonly give yearly	72
Total	908

Which ſum of 908 pataques is independent of the management of the rice fields.

I ſhall ſuppoſe that the ten ſedans, after the rice is taken off the ground, are ſowed with trefoil or wheat, &c. and I ſhall compare the produce ariſing from theſe two modes of management.

The rice is ſown in the month of Germinal. Before it is committed to the ſoil, it is ſteeped five or ſix days, in boxes immerſed in the Nile, or the canals which branch from it. When it is ſufficiently ſoftened by the water, it is ſpread on mats, formed into little heaps, and covered up with hay. The heat, produced in each of

theſe maſſes, induces germination, and the rice is not thrown into the ground, till the germ is ſufficiently developed.

The field appointed to receive it, is firſt kept under water for ſeveral days. It is next ploughed in two different directions, perpendicular to each other: it then receives a third ploughing, after which it is again ſubmerged. To ſmooth its ſurface a long piece of wood, drawn by two oxen, is paſſed over it. It is then cleanſed with a kind of rake, and, it being now reduced to a puddle, the rice is thrown into it while in this ſtate.

Two days afterwards the land is covered anew with water, to the depth of about two inches, which remains on it for two or three days. The water is then drained off, and is ſucceeded by a new ſubmerſion, which remains for the ſame time: and this operation is continued till the harveſt.

Twenty or thirty days after the rice is ſown, according as the vegetation is more or leſs advanced, the rice-field is weeded, and they are careful in removing all intruſive plants as they make their appearance.

As one grain of rice almoſt always produces ſeveral ſtalks, a part of them is drawn out and tranſ-

tranſplanted into a convenient field prepared for them.

The rice harveſt takes place towards the end of Brumaire. It is reaped like corn, tied up into little ſheafs, and carried to a floor, where the grain is ſeparated from the ſtraw by a particular inſtrument. It is then cleanſed, huſked, put up in baſkets made of palm-tree leaves, and thus preſerved for uſe.

Nothing can be more ſimple than the Egyptian inſtruments of huſbandry, and from hence, and the preſent indiſpoſition of that people to improvements, we may infer the remote antiquity of thoſe inſtruments.

Their plough is compoſed of two pieces of wood, united at one of their extremities, at an angle of about fifty or ſixty degrees. The longeſt carries at the other end the yoke to which the oxen are faſtened: the ſhorteſt is armed with a ſhare, in form of a ſpade, which, in tracing the furrow, throws the mould equally on each ſide.

It is directed by a man who, with one hand, keeps it in a vertical plane, by means of two upright bars *(montants)*, and, with the other, conducts the oxen.

The miry ſtate into which the land is reduced

when the ſeed is caſt into it, renders the harrow uſeleſs, but its place is ſupplied by the trunk of a tree drawn horizontally.

The ſickle of the Egyptians is exactly of the ſame form with that uſed in France; but it appeared to be ſomewhat ſmaller. It is uſed equally for reaping rice, wheat, barley, and trefoil.

To ſeparate the rice from its pedicle, or ſtalk, they employ a very complicated machine. It is compoſed of a horizontal frame, formed of four pieces joined together at right angles. Two of theſe pieces receive, in a poſition parallel to the two others, three wooden axles, on which are fixed, by their centres, three and four wheels of plate-iron, two millimetres in thickneſs, and four decimetres in height. Thus the whole aſſemblage is moveable horizontally upon the wheels, which are ſo diſpoſed, that thoſe fixed on the ſame axle correſpond to the middle of the ſpace included between thoſe fixed on the next following axle.* Above this frame is fixed a kind of ſeat, of clumſy joinery,

* It coſt the Tranſlator, though not unaccuſtomed to contemplate machinery, ſome thought to underſtand the ſtructure and action of this machine, from this *merely verbal* deſcription of it. The reader will obſerve, in the preſent work,

joinery, on which ſits the conductor of the oxen, yoked to it. This machine, which reſembles a rolling chair, is drawn, for ſix hours, in all directions, over the ſheaves of rice, which are unbound and ſpread upon an area containing about four hundred ſquare metres. This operation being finiſhed, the rice, though diſengaged from its ſtalk, is ſtill mixed with other ſeeds and extraneous ſubſtances; they therefore fan it groſsly, by toſſing up ſmall portions of it with wooden forks, the wind carrying off only the lighteſt parts. But the rice, to be perfectly cleanſed, muſt be paſſed ſeveral times through ſieves, which is done at the mills where they ſtrip off its huſk.

I now proceed to enumerate the articles of expenditure, in ſowing ten fedans with rice.

They ſow on a fedan three eights of a dareb; but as they throw ſeed only into half of the land, the other half being reſerved for the tranſplantation of the ſuperabundant ſhoots plucked out of the ſown fields, the ten fedans will require but fifteen eighths of a dareb, which, at the rate of

work, ſome other inſtances, in which plates would have been uſeful, not to ſay neceſſary; and it is ſurpriſing that they have been omitted, or ſo ſparingly furniſhed, in the French original. *Tranſlator.*

twenty-four pataques, each dareb will coſt 45 P.

Beſides the labourers hired by the year, the cultivator is obliged to employed extra jobbers in weeding, tranſplanting the rice, and cleanſing the canals. The number of days they are ſo employed may be reckoned at four hundred and fifty, which, at ten paras each, make — — — 90

The day-labourers, who are employed in harveſt, are paid in kind. The reapers, and thoſe who carry the ſheaves to the area, are paid a dareb of rice 24

Thoſe who drive the oxen, yoked in the carriage for ſeparating the grain from the ſtalk, receive for the harveſt work of ten fedans, ſuch as it may be, five ſixteenths of a dareb — — 7 45

Total expence of ſowing and reaping the rice — — — 126 45

Annual expence, independent of this, found above — — — 908

Total — — 1034 45

Immediately after the rice has been reaped, the land is covered with water for ſome days, and,

and, without any preparatory labour, ſown anew with trefoil, the only fodder known in the province of Damietta.

They ſow on a fedan three meaſures of ſeed, each worth thirty paras, which, for the ten fedans, amount to 10 *P.*

The cutting of the fodder, of which they have three crops from the month of Frimare till the ſpring, coſts only ten pataques, a part of this work being done by the labourers employed for the whole year, whoſe wages have been already ſtated — — — 10

Sum — 20

Adding to this ſum that which has been ſtated as independent advances, and the expences relative to the culture of the rice, — — 1034 45

We ſhall have for the expence of cultivating ten fedans, ſown ſucceſſively with rice and trefoil, a total of 1054 45

The lands about Damietta, in the beſt years, yield ſix darebs of rice per fedan, and in the worſt, only one: the mean between theſe ex-

tremes, ſuppoſing the number of good years equal to that of the worſt, is three darebs and a half. Thus we may ſuppoſe that ten fedans yield, in common years, thirty-five darebs, which, at twenty-four pataques each, produce 840 P.

The ſtraw of the crop of rice is only uſed for burning, and is worth — 12

We may ſuppoſe that ſix tenths of the trefoil, ſowed after the rice is reaped, are ſold green, and that the other four-tenths are dried.

The crop of a fedan of green trefoil is ſold for fifteen pataques: thus the three crops of a fedan will give 45 pataques, which, for ſix fedans, is 270

The crop of a fedan of dried trefoil ſells for twelve pataques, and the value of three crops of the four remaining fedans, is — — 144

Total value of ten fedans in rice and trefoil, — — 1266

Deducting from this ſum the amount of the expences of cultivation, there remains, for the profit of the cultivator, 231 pataques, 45 paras.

It remains that we enquire what would be the profit,

profit, if inſtead of trefoil, wheat had been ſown, after the crop of rice, on the ten fedans, which we ſuppoſe in cultivation.

The labour and other preparations of the ſoil, in which the wheat is to be ſown, are performed by the cultivator's own people. Their wages having been comprehended in the independent advances, as alſo the maintenance of the oxen employed in their labours, we have only to reckon here, the value of the ſeed, and the expences of the harveſt.

Half an ardeb of wheat, which is commonly ſowed on a fedan of land, at the rate of 6 pataques per ardeb, cauſes, for the ten fedans, an expence of — — 30 P.

Expences of reaping, eſtimated in the ſame manner as the reaping of the rice, at three pataques per fedan 30

The former expences were found to be — — 1034 45

We ſhall then have, for the annual expence of ten fedans ſowed ſucceſſively with rice and wheat 1094 45

Lands in wheat bring, in common years, five ardebs per fedan, which, at the rate of 6 pataques

ques per ardeb, produces for the crop of the ten fedans — — 300 *P.*

The ſtraw of one fedan of wheat is ſold for 6 pataques, or for the ten fedans 60.

Anterior value of the rice — 852

Total produce of the ten fedans, ſown ſucceſſively with rice and wheat 1212

Deducting from this ſum, the expences of cultivation, which we found amounted to 1094 pataques 45 paras, there remains, for the profit of the cultivator, 117 pataques 45 paras.

The reſults of the details into which we have entered, are

1ſt, That lands ſown with rice, in the province of Damietta, produce, in common years 18'4 for one; whereas thoſe ſown with wheat only produce 10.

2dly, That the mean price, per day, of the labours of agriculture is 10 paras.

3dly, That the feeding of the oxen, may be eſtimated at 12 paras per day, in the different ſeaſons of the year.

On this laſt article, I muſt obſerve, that the oxen which work the mills for cleaning the rice, of which I ſhall hereafter ſpeak, being generally a great deal ſtronger, and having more ſevere labour

bour to undergo, require for their daily ſupport, an expence of not leſs than 18 or 20 paras.

Barley is ſown in places where the irrigation is more difficult, and where only a ſmall number of cattle can be kept. The produce of the grain ſown in rice-grounds would not be ſufficient to compenſate the coſt of irrigation, which muſt always be ſupported, whatever be the ſucceſſion of crops.

As to flax, what is uſed in the linen manufactures of Damietta, comes from the neighbourhood of Manſoura, Semenhoueh and Cairo. Nevertheleſs experience has proved, that it may be cultivated in the province of Damietta. The following is ſome information, furniſhed by the Sheik of Senanieh, who told me that he was the firſt perſon in the country who entered upon the culture of this article.

The land on which the flax is to be ſown is allowed to lie fallow for ſix or ſeven months. It is then ploughed four times, and covered with a layer of aſhes, after which the flax is ſown. It remains upon the land, from Frimaire to Germinal.

The field is interſected with little trenches, into which water is introduced, when the plant requires irrigation. Immediately after the flax is reaped, the land is prepared to receive rice tranſplanted from ſome other field.

The

	Pataques.
The expence for labour for ten fedans, is	23
Manure, including its carriage —	16
Half an ardeb of ſeed is ſown on each fedan, which, at the rate of nine pataques per ardeb, occaſions for the ten fedans, an expence of — — —	46
Irrigation, at different times —	20
Reaping the flax, at the rate of ſix pataques per fedan — —	60
Spreading it on the field, and making it up into ſheafs — —	30
Threſhing out and collecting the ſeed	35
Carrying home the flax, at leaſt —	40
Steeping it, and the concomitant expences	36
Total expence of cultivation	306

Three ardebs of flax-ſeed are gathered from each fedan. It is ſold at 9 pataques and 54 paras per ardeb, which produces, for the ten fedans, — — 288

The flax reaped from a fedan is ſold for 22 pataques, and for the ten fedans 220

Total produce — 508

Deducting

Deducting from this ſum the expence of cultivation, there remains for the profit of the cultivator, 192 pataques. This profit of 192 pataques, will appear extraordinary, when compared with that which reſults from the cultivation of rice; but I would obſerve, that in the detail of expences, I have only included the hire *(location)* of the oxen, during the time of their being employed by the cultivator in labour and irrigation.

All the lands in the neighbourhood of Damietta, are ſold at the rate of ten times their annual rent, deducting taxes. The ſame cauſes which have raiſed the intereſt of money above its ordinary rate, in ſeveral of the States of Europe, have in Egypt depreſſed the value of land, in which individuals, ſtrictly ſpeaking, poſſeſs only a life-rent; the grand Signior, being, according to the common opinion, the ſole proprietor of the land, ever ſince the conqueſt of the country by the Sultan Selim, in 1517.

The proprietors receive the rent of the land in kind, or in money. When they are paid in kind, common uſage aſſigns them one third of the crop, the farmer defraying all the expences of cultivation. This rent, reduced to money, varies from 10 to 4 pataques per ſedan, according as irrigation is more or leſs eaſy.

Of

Of the different productions of which I have been ſpeaking, rice is the only conſtant object of commerce. It is exported to the different ſea-ports of Syria, to the iſlands of the Archipelago, and in general to every part of Turkey. But it is not exported in the ſtate in which it comes from the hands of the cultivator. The merchants of Damietta commonly purchaſe it in a rough ſtate, and have it cleanſed and huſked. Here follow ſome details concerning the mechanical part of that operation, and the expences with which it is attended.

The rice is firſt expoſed to the ſun for ten or fifteen days. It is then paſſed under hollow cylindrical peſtles *(pilons)*, of iron, about three decimetres in height, and one in diameter. The peſtles are fixed at right angles, to a handle *(manche)*, moveable in a vertical plane, upon an axle placed at one metre from their extremities. The movement of the ſweep *(baſcule)*, is produced, like that of a forge hammer, by the preſſure ſucceſſively exerted on the extremity of the handle, by four cogs *(mentonnets)*, which croſs the horizontal axle of a cog-wheel, put in motion by a larger one, whoſe vertical axle carries a lever to which one or more oxen are yoked, according as the machine is furniſhed with two or four peſtles.

The

The rice is placed under theſe peſtles, in a kind of mortars fixed in the ground, each of which contain the tenth of a dareb. They are about a metre aſunder, ſo that the intermediate wall which ſupports the axle of the peſtles, ſerves as a ſeat for a labourer, whoſe conſtant employment is to return, under the peſtles, the rice which tends to eſcape at each ſtroke.

The grain is at firſt ſubjected to this operation for two hours, that time being ſufficient to free it from a part of the huſk; but as the action of the peſtles upon it in this ſtate, would be partly loſt on the huſks already detached, the rice is taken out to be cleaned. It is then put under the peſtles for two hours more; when, being again cleaned, it is a third time ſubjected to the ſame operation. A fourth beating, along with a certain quantity of ſalt, completely cleans it; after which it is ſent to market in the ſtate in which we ſee it.

The labour of, at leaſt, thirty hours is neceſſary for compleatly cleaning a dareb of rough rice, which, when the grain is good, produces an ardeb and two-thirds of clean rice, and an ardeb and a half, if the grain be of an inferior quality. Thus we may ſuppoſe that the medium produce of a dareb is ſeven-twelfths of an ardeb.

A mill

A mill with two peſtles, kept working day and night, requires nine oxen and ſeven labourers, relieving one another by turns. The expence of ſupporting the oxen, the wages of the labourers, the intereſt of the firſt advances, and the wear and tear of the machine and buildings, make the price of cleaning a dareb of rice amount to five pataques, and that of cleaning an ardeb, to three pataques fifteen paras. If to this we add twenty per cent for the profit of the merchant, the rice, as it lies in the warehouſes of Damietta, coſts, in common years, twenty-two pataques per ardeb.

It appears from the cuſtom-houſe books of this place, that the quantity of rice exported, for eight years, from the port of Damietta, was 228,357 ardebs, which makes an annual average exportation of 28,544 ardebs.*

* The quantity of rice exported was,

In 1791	38,853 ardebs
In 1792	31,039
In 1793	26,256
In 1794	19,242
In 1795	24,275
In 1796	22,315
In 1797	29,544
In 1798	36,863
Total	228,387
Average annual exportation	28,544

Such

Such is the information which I have collected, concerning the cultivation and commerce of rice. I make no doubt but, by new researches, one might obtain results much nearer the truth. But, to obtain them with the utmost accuracy, the cultivators, whom it will be necessary to consult on the produce of their lands, must be well convinced that the questions addressed to them, are not put with a view to load them with new taxes: otherwise they will always be inclined, as they are at present, to magnify the account of their expences, at the same time that they will endeavour to diminish that of their profits.

Observations on

THE FOUNTAIN OF MOSES.

By Citizen GASPARD MONGE.

ON the western shore of the Gulph of Suez, four leagues to the south of the town, and almost opposite to the valley of Pilgrimage (*Egarement*), are certain springs marked on all maps, and known by the name of the fountain of Moses. It would be a mistake to suppose, that the name of those springs derived its origin from the fabulous times of Egypt, and had been preserved till our days, by uninterrupted tradition. It is very probable that, like the fountain of the Virgin at Matarieh, (the ancient Heliopolis) and like some others, that name does not reach beyond the establishment of Christianity in Egypt, when the ancient names relating to an exploded religion, gave place to others analogous to the new opinions.

Although the water of the fountain of Moses be less salt than that of many wells dug in other parts of the desert, yet it is brackish, and consequently does not quench thirst so well as fresh water:

water: but it is capable of preſerving vegetable and animal life, and we drank it for four and twenty hours, during a painful journey, without being incommoded by it. Beſides, as this water is continually exhauſted and renewed, it is always tranſparent, and hath no diſagreeable ſmell or taſte; whereas that of moſt other wells is commonly rendered turbid by the agitation excited in drawing it, and has almoſt always a fetid odour. For example, the well of Agirout, ſituated four leagues to the north of Suez, and which refreſhes the caravan of Mecca, on the third day from Cairo, is two hundred feet deep; but the putrefaction of the animal and vegetable ſubſtances which fall into it, from accidents almoſt unavoidable, gives the water, in addition to its natural ſaltneſs, an odour of ſulphurated hydrogene which is ſcarcely ſupportable.

In all ages the fountain of Moſes muſt have been exceedingly valuable to the Arabians of Tor, who inhabit the neighbourhood of Mount Sinai. The Arabians, obliged to draw from Egypt a part of their ſubſiſtence, and the objects of foreign induſtry, muſt always have carried in exchange the products of the meagre foreſts, which cover their mountains. This tranſport could only be

performed by caravans, and the fountain of Moſes muſt always have been one of their ſtations. Beſides, from the time when maritime eſtabliſhments were formed in the bottom of the gulph, whether at Suez itſelf, or at the entry of the valley of Pilgrimage, on the road from the Red Sea to Memphis, the fountain of Moſes muſt have been frequented; becauſe it was an indiſpenſible reſource when, after long droughts, the ciſterns for preſerving rain water were exhauſted.

But the epoch at which the fountain of Moſes appears to have excited the moſt intereſt, is that of the war which the Venetians and the Egyptians jointly waged with the Portugueſe, after the diſcovery of the paſſage to the Indies, by the Cape of Good Hope. It is well known that theſe republicans, in order to defend the ſceptre of commerce which they had hitherto held, and which was about to elude their graſp, built and armed fleets at Suez. It is not probable that they ever eſtabliſhed dock-yards at the fountain of Moſes, which preſented no local advantages for ſuch an object; but it appears that they formed an extenſive watering place there. No part of the works which were above ground remains. The

whole

whole has been ſcattered or deſtroyed by the Arabs, except the foundations and ſome ſubterraneous works. Theſe veſtiges, which are ſtill conſiderable, and which, during our ſhort ſtay, we could but partially ſurvey, principally conſiſt of large reſervoirs conſtructed with care, to which the water was brought from the ſprings, in ſubterraneous channels, and from whence it was conducted by a great channel to the ſea ſhore. General Buonaparte diſcovered this laſt channel, and had it ſurveyed in its whole extent, which is from ſeven to eight hundred fathoms. It is conſtructed of good maſonry, covered through its whole length, and has the ſame declivity with that of the ſoil in which it is formed. The ſand, which the water has carried into it ſince it was abandoned, has obſtructed it in the firſt fifty fathoms; but all the reſt is in ſo good a condition, that, with a moderate expence, it might be repaired, and made fit for ſervice. On the beach, the channel terminates between two ſmall mounts (*mamelons*), lengthened out with rubbiſh, and which appeared to us to be the veſtiges of a watering place properly ſo called. This watering place muſt have been diſpoſed in a manner agreeing with the form and nature of the veſſels in which they generally embarked the water.

At the diſtance of two hundred fathoms, to the northward of the laſt ſpring, there is a conſiderable hillock, which, like the *Monte Teſtaccio* at Rome, is wholly formed of fragments of jars, and other earthen veſſels, ſpoiled in the burning. We found evident remains of furnaces, ſo that there muſt have been on that ſpot, a large manufactory of pottery. The object of that eſtabliſhment could not be the fabrication of the earthen ware, which compoſes the chain pumps *(chapelets*)*, by which the water is drawn from the wells, to irrigate the lands throughout all Egypt, which have not the advantage of inundation. Indeed, ever ſince the lands about the fountain of Moſes were inhabited, they were cultivated all the way from the ſprings to the ſhore. We ſtill ſee there a great number of young date trees, diſtributed with an order which cannot be the effect of chance. Theſe date trees, which have probably ſprung from the ſtocks of old ones, are at leaſt an indication of an ancient cultiva-

* In Saverien's *Dictionnaire de Mathematique*, &c. *chapelet* is deſcribed as a ſort of chain pump, which he ſays, on the authority of Perrault, was invented by a Florentine of the name of Francini, and executed about the year 1680, in the French King's library at Paris. But this engine is probably of a different conſtruction from that mentioned in the text, which is ſaid below to be of high antiquity.—*Tranſlator.*

tion,

tion, which hath been abandoned. But that cultivation required no drawing of water for irrigation; for the water of the fountains could eaſily be conducted, in open trenches, to all the cultivated fields, and therefore the chain pumps were not neceſſary. Accordingly, among the great number of fragments which form the hillock, we did not find one which could have belonged to the chain pumps, the form of which hath not varied for many ages. And we were inclined to believe, that the object of eſtabliſhing this great pottery was the manufacture of large jars, to keep water on ſhip-board, in a country where the ſcarcity of wood, and perhaps the want of induſtry, rendered the conſtruction of caſks impracticable. Thus, thoſe who came for water to the fountain of Moſes, were ſure to find there jars proper to contain it, and probably other earthen veſſels for which they had occaſion.

The fountain of Moſes preſents a remarkable hydroſtatical phenomenon. The different ſprings which compoſe it, and which are eight in number, are all ſituated on the tops of conical hillocks, each terminating in a crater, which forms a baſon for its ſpring, the water running down the conical ſurface in natural channels. Thoſe hillocks are of different heights: the higheſt is elevated

about forty feet above the ſurrounding ſurface. The ſpring of this laſt has been long dried up, its crater is filled with ſand, which the wind has carried into it, and there is ſtill near it the trunk of a date tree, which, after attaining a great height, was cut down by the Arabs.

It was not difficult for us to give a reaſon for the formation of the hillocks, on the top of which the ſprings ariſe. The humidity which the water of a ſpring diffuſes through the neighbouring ſoil, preſerves around its baſon a perpetual vegetation. The graſs produced by that vegetation diminiſhes the velocity of the wind which agitates it, and makes it leave the larger grains of the ſand which it carries along. This ſand, ſheltered by the ſtalks, at the roots of which it is depoſited, and retained by the moiſture which makes it begin to adhere, is enabled to reſiſt the attacks of the moſt violent wind. The carbonat, or the ſulphat of lime, which the water of the ſpring holds in ſolution, and which is denuded by evaporation, cryſtallizes among the grains of ſand, and forms a glutinous ſubſtance, which compleats their adherence. Hence the edges of the baſon are a little raiſed, and the water is forced proportionably to raiſe its level, in order to make its eſcape from the baſon, and to diffuſe

diffuſe itſelf abroad. The circumſtances which give riſe to this operation, being, from their nature, often repeated, their progreſs, though ſlow, are, ſo to ſpeak, continual, and, after a long lapſe of time, the ſpring, which is always gaining elevation, iſſues from the ſummit of a little conical hill, formed of a ſandy ſtone, which ſtrikes fire with ſteel, and is impregnated with ſalt, like the water of the fountain.

The ſpring, which has the moſt elevated crater, being dried up, it is natural to ſuppoſe that the height of forty feet, to which it has arrived, is a *maximum*, determined not ſo much by the preſſure which affects it at the baſe of the hillock, as by the reſiſtance of the walls of the natural ſubterraneous conduits which convey it; ſo that the water having reached that height, might have burſt thoſe walls, broke out at other iſſues, and produced new ſprings, which drained the firſt, and which, in ſucceſſion, have formed the little hills on the tops of which they are all at preſent ſituated.

However this may be, it is very probable, that at a remote period, the fountain of Moſes had no other exit than that which has been long dried up, and that the eight ſprings which now afford water, and whoſe craters are leſs elevated, have

have been produced at a later period, either by the natural rupture of too weak conduits, or by the excavations which have been made for different purpoſes, at the time when the fountain was frequented, and when its vicinity was inhabited.

It would have been intereſting to examine the form and ſtructure of the natural channels which convey the water to the fountain of Moſes, acroſs an extenſive plain of ſand, and in which it bears a preſſure capable of raiſing it more than forty feet above its level, and to aſcertain whether this water comes from a chain of mountains which originate in Syria, and terminate at Mount Sinai, and which is ſeen at the diſtance of about four leagues to the eaſt of the fountain; but our time would not allow us to enter on theſe reſearches, which were of no immediate utility.

EXTRACTS

EXTRACTS

From the Geography of Abd-er-raſhid El-Bakouy, on the Deſcription of Egypt,

By Citizen MARCEL.

ALY* Abd-er-raſhid, Ebn-ſaleh, Ebn-Noury, ſirnamed El-Bakouy, was a native of Bakouieh†, a very conſiderable town, ſituated in the

* In the National Library is a copy of this work, No. 585, of Arabic MSS. I ſhall take the liberty to extract from it ſome various readings, in order to compleat the intereſting remarks of Citizen Marcel, and thoſe which Citizen Deguignes has made on the ſame work, and which are to be found in the ſecond volume of *Notices & Extraits des Manuſcrits de la Bibliotheque Nationale.*—L—s. (Theſe letters, L—s, ſtand for the name of Langlés, one of the librarians in the *Bibliotheque Nationale.*—*Tranſlator.*)

† Bakouieh, or Bakou, is a port on the Caſpian Sea, and the capital of Shirvan, the northern province of Perſia. This town is known in Europe by its commerce, and famous in the Eaſt, eſpecially among the Hindoos, on account of the ſprings of Naphtha, which exiſt in its neighbourhood. The followers of Brachma have gone on pilgrimage to thoſe ſprings, from the moſt remote times, as the Pouranas, and other ancient Sanſcrit books, atteſt. Among the numerous European travellers who have ſpoken of Bakou, I ſhall content

the country of Derbend, on the borders of the Caſpian Sea. His father, El-Imam El-alem ſaleh ebn Noury, followed the ſect of the Iman Shafey* and arrived at extreme old age.

The year of the birth of Abd-er-raſhid is not well determined; but it is certain that he wrote about the year 806 of the Hegira, or 1403 of the vulgar æra. His work, entitled *Kitab talkis El-atſar fy ajaib El-melik El-kahar*, that is, the

content myſelf with citing the intereſting and adventurous Forſter, who viſited thoſe ſprings of Naphtha, called *Ateſh-gah* (the place of fire in Perſian), and who recounts a long converſation which he had with the Hindoo mendicants, or hermits, who have ſettled near this place of devotion to receive their pious countrymen. See *A Journey from Bengal to England, through the Northern part of India, Kaſhmire, Afghaniſtan and Perſia, and into Ruſſia, by the Caſpian Sea.* Vol. ii. p. 227, 231. (L—s.)

* Doctor *Abou Abdallah, Mohammed ebn Edryſ*, ſirnamed *Eſh Shafei*, was the firſt who wrote on the muſſulman juriſprudence. He compoſed a book on the *Oſſoul*, or foundations of iſlamiſm, in which are compriſed all the laws of the Mahometans, both civil and religious. There are beſide two works of his, entitled *Sounan* and *Meſnad*, on the ſame ſubject. He became the founder, and the chief of one of the ſects acknowledged to be orthodox by the muſſulmans; and his doctrine is in ſuch eſtimation in the Eaſt, that *Salah-ed-Din* (Saladin) founded at Cairo a college, in which any other ſyſtem was prohibited to be profeſſed or taught.

book

book explaining the traditions concerning the wonders of the Almighty King, is a kind of univerſal geography, arranged according to the order of the climates, the compoſition of which he finiſhed in the 815th* year of the Hegira, or the 1412th of the common æra.

I thought that an extract from this work, relative to the deſcription of Egypt, might be uſeful upon many accounts: and this conſideration has induced me to make public an extract, which I made for my own private uſe.

It ſeemed to me, that in our preſent circumſtances, it was abſolutely neceſſary for us to become as accurately acquainted with Egypt as poſſible, and that one of the moſt effectual means to acquire that acquaintance, was a compariſon of what modern travellers and European geographers have written concerning that celebrated country, with a deſcription which the oriental writers gave of it ſome ages before, and with the

* The manuſcript in the National Library has theſe words, p. 142, *Seneh ſet oue aſher oue tſemanmaich*, "this "writing came from the pen of its author, in the year "*eight hundred and ſixteen*," and not 806, as is intimated in the Remarks of citizen Deguignes, p. 456, and which is viſibly an error in the printing. (L—s.)

accounts,

accounts left us by Greek hiſtorians, and geographers, at a period much more remote.

I have therefore made with pleaſure an extract from one of the Arabian Geographers, whoſe writings, though leſs known in Europe than thoſe of many other oriental authors, contain nevertheleſs details perhaps as valuable as thoſe which have a more extended reputation among us, details which may be ſuppoſed ſo much the more curious and intereſting, as they have been hitherto unknown.

It muſt be allowed, that the work of Abd-erraſhid contains, in common with thoſe of all the eaſtern writers, ſome inaccuracies, which ariſe from their general ignorance of ancient hiſtory; but theſe inaccuracies are eaſily perceived, and hence there is little danger of their leading us into error.

The orientals interlard all their writings with prodigies and extravagant ſtories, to which they give entire credit. I thought it my duty not to retrench any of theſe fables in this extract, and that I ought to leave the author his own oriental ſtyle and original form; as thoſe fictions afford us the means of appreciating more exactly the progreſs which the ſciences and geographical knowledge

knowledge had made in the Eaſt, at the epoch when Abd-er-raſhid wrote.

Beſides, it ſhould be conſidered, that almoſt all thoſe fables are only truths more or leſs diſfigured, which always ſubſiſt under the groſs covering with which credulity and error have thought proper to conceal them; and perhaps it belongs to true philoſophy, reſtored by victory to her original country, to carry her illuminating torch under theſe thick veils, to expoſe by her light that incoherent maſs of heterogeneous opinions, that chaos of ſyſtems, differently altered, which circulate among all the people of the Eaſt, and, by clear diſcuſſion, to draw from them ſome real facts, ſome accurate truths, which hitherto might have eſcaped the moſt penetrating and attentive eyes.

Theſe extracts, from the geography of Abd-er-raſhid, will be followed by ſome portions of Aboul-faraje, and other oriental hiſtorians, from whom it cannot be diſputed that we ought neceſſarily to draw our information, if we wiſh to have that true knowledge of the hiſtory of the Eaſt, which can only be derived from that channel.

First Extract.

Of Egypt in General.

THE parts of the earth capable of being inhabited, both on the north and ſouth, are divided into ſeven climates of different magnitudes. They extend in length, from the weſt to the eaſt, from the iſlands called *Jeſair-el-Kalidat* (the Canaries), whence *Bathalmious El-Kloudy** (Ptolomy) hath begun to calculate his degrees. They comprehend all the region of the earth which extends between the two ſeas. Their

* It is thus that the learned Caſiri, in his *Bibliotheca Arabico-hiſpana*, tom. 1. p. 349, and other orientaliſts, read this word, and they tranſlate it by *Claudius*. But I adopt much more willingly the ſentiment of D'Herbelot (Biblioth. Orient. p. 193), who reads it, *floudy* (or floudſy), and tranſlates it, *a native of Peluſium*. In fact, Ptolomy was a native of that town, which is now called *Thineh*. (See D'Anville's Memoir on Egypt, p. 97.—The change of kloudſy into floudſy is ſo much the more eaſy, as there is only the difference of a diacritic point, inſtead of two, over the initial letter, which produces a *fe* inſtead of a *kaf*. Add to this that in Arabic, as in our European languages, the firſt name always precedes the appellative. It muſt then have been *el-kloudſy el-bathalmious*, or rather *el-kloudious*; for all the Latin words terminating in *us*, preſerve that termination in Arabic: beſides, the national name is always placed after the proper name.—(L—s.)

breadth

breadth, from north to ſouth, extends from the circle of the ſtar *Sohail* (Canopus) to that of *Benat-en-Nach**, the Great Bear.

The *Said*, or Upper Egypt, and the courſe of the Nile, make a part of the firſt and ſecond climates: this region extends on the ſouth to the country of *Noubeh* (Nubia).

Lower Egypt, the towns of *Meſr* (Cairo), and of *Iſkenderieh* (Alexandria), are contained in the third climate; at its extremity, the length of the day is thirteen hours and a half and a quarter.

Meſr (Egypt in general). The extent of this famous country is forty miles†. Its length is from *El-Ariſh* to *Aſouan*, and its breadth from *Eilah* to *Barkah*. The name which it bears comes from *Meſr*, the ſon of *Meſ-*

* Literally, *the daughters of the funeral car*. This expreſſion particularly denotes the three laſt ſtars, which form the tail of the Great Bear, although it be often applied to the whole conſtellation, which is alſo called *Ed-Doubbeh* (the Bear).

† The manuſcript in the National Library ſignifies *forty nights*. The ſame expreſſions are found in the geographical and hiſtorical deſcription of Egypt by *Al Makriſy*, No. 797 of the Arabic manuſcripts, p. 11. The Arabian authors frequently reckon by nights', and not by days', journeys. This meaſure is the ſame to them, and is equivalent to ſix or ſeven of our common leagues.—(L—s.)

*raim**, the ſon of *Cham*. It is looked upon as the beſt country in the world; and, as long as there are men in it, abundance will reign there. It is ſurrounded with moving ſands, which are agitated by the impulſe of the winds. It very ſeldom rains there, and the little rain which falls, only augments its fertility and its riches. At the end of ſummer, the time when all waters commonly diminiſh, the Nile acquires, on the contrary, ſuch an increaſe, that all the lands of Egypt are inundated; and, when this increaſe riſes to 12 cubits, it is ſolemnly announced to the people.

There is in the middle of the Nile, a moſque, built by the Califf *Al-Mamoun*†, when he came into

* GEN. ch. x. 7.

† *Al-Mamoun aboul abbas, abd-oullah, ebn Haroun.* This prince, the ſon of Califf *Haroun-ar-Raſhid*, was the ſeventh Califf of the houſe of the *Abbacides*. He was born in the year 170 of the Hegira (786 of the common æra) and ſucceeded, in the year 198 (813) to his brother the Califf *El-Amin Mohammed ebn Haroun*.

The memory of *Al-Mamoun* will always be dear to literature and the ſciences, which he loved and protected in an effectual manner, and favoured their progreſs and advancement with all his power, and at an extraordinary expence.

It is to him that the Arabians owe the knowledge of the beſt

into Egypt. Behind this moſque, is a *canal*, from the midſt of which riſes a column of white marble 24 cubits in height. Every cubit of it is

beſt books in Hebrew, Syriac, Greek and Latin, which he cauſed to be tranſlated into Arabic, and extended and encouraged the ſtudy of them. To him alſo, the learned in Europe owe the preſervation of ſundry works and fragments of ancient Greek and Latin authors, who, no longer exiſting in their original languages, have found a refuge in the Arabic tranſlations.

Not content with having transfuſed into his own language, the riches of other nations, Al-Mamoun wiſhed alſo to invite all the learned men whom he could collect, not only among the nations ſubjected to his empire, but alſo among the Jews, the Chriſtians, the Greeks and Perſians, and even among the Magi, the Guebres and the Indians. Whatever was their ſect or their religion, they partook equally of his favours. He was happy in their ſociety, and delighted above all things, in aſſiſting at their literary diſcuſſions.

Under his reign, flouriſhed the aſtronomer *Habejh el-Meroüzy*, the author of three books of aſtronomical tables, *Ahmed ebn Kotſeir el-Farghany*, known to us, under the name of *Alfragan*, *Abdoullah ebn Sahel ebn Noubakht*, *Mohammed ebn moucy el khouarezmy*, *Ma-ſha-allah el yehoudy*, and *Yahia ebn-Abyl-manſour*, whom he cauſed to make a great number of aſtronomical obſervations, at *Chamaſieh*, near Bagdad, and on mount *Kaſioun* near Damaſcus.

Among the learned phyſicians, whom he aſſembled at his court, we diſtinguiſh *Sahel ebn ſabour*, ſirnamed el-kouceje, *Jebrail*, who treated of the diſeaſes of the eye, and *Youhanna ebn-el-Bathrik*, to whom was given the name of *el-ter-*

is marked and divided into 24 inches, and each inch is again ſubdivided into 6 lines, or ſmall meaſures. This column ſerves to indicate with exactneſs, the ſucceſſive augmentations of the Nile, the overflowing waters of which cover the earth for the ſpace of forty days*.

The Nile is generally regarded as the river which has the longeſt courſe. It is ſaid to extend one month in the country of the muſſulmans, two months in that of *Noubeh*, (Nubia) and four months in the deſerts which contain its ſource. It has its origin in the Belad el-Kamar (the country of the moon) beyond the equatorial circle; and runs from ſouth to north, in the hotteſt regions. Its augmentations and diminutions take place in regular proportion. This river gives birth to a great number of *Temſah* (crocodiles) animals which exiſt no where elſe,

jeman (the tranſlator) becauſe he tranſlated into Arabic, the Greek authors who wrote on medicine.

Al-Mamoun, after reigning twenty years and eight months, died of the fever and ague, near the river *Bedendoun*, at the age of 48, in the year 218 of the Hegira, or 833 of the common æra.

* In the manuſcript lodged in the national library, the word rendered in this paragraph *canal*, is *Sehrije*, a baſon, a fiſh-pond. What is meant, is the *Mekias*, of the iſland of *Raoudhah*, conſtructed by order of *al-Mamoun*, in the 200th year of the Hegira (L-s.)

except

except in the river *Sind*, which waters the country of *Hende* (India) but thoſe which are produced in this laſt river are much leſs than thoſe of the Nile*.

There is alſo in Egypt, a tree which is luminous during the night, and appears as if covered with flame. The Greeks gave it the name of *Moukikous*.

That country likewiſe produces a plant, of which cords and cables are made. The natives of Egypt give it the name of *Dis* (a kind of reed).

The mountains of Safan † produce cottons of a ſingular

* The Sind (*Sindhy* in Sanſcrit) alſo forms, like the Nile, a Delta at its mouth; and major Rennel, in his *Memoir for a map of Hindoſtan*, p. 285, points out many ſtriking reſemblances between the province of Sind and Egypt. It is alſo obſervable, that crocodiles are not rare in ſeveral parts of Africa and Aſia, and particularly in India, where there appear to be two ſpecies. (L—s.)

† The manuſcript in the national library, makes no mention of the mountains of Safan, and I even doubt whether any mountains in Egypt ever bore that name. Perhaps the tranſlator ſaw a diacritic point where there ſhould not have been one, and read *Jebal el Safan* (the mountains of Safan) inſtead of *Habbal el-ſufun* (cables of veſſels) as the Arabians uſually ſuppreſs the vowels, theſe two readings offer no difference, but the diacritic point which I have mentioned. The ſenſe which I propoſe, appears to me to be juſtified by the following words, "They make with theſe

 "reeds,

a ſingular nature. They are kindled, burn, and are extinguiſhed, like a flambeau; inſomuch, that, when a light is wanted, it is ſufficient to take them by one end and agitate them for ſome time: the motion inflames them, without the contact of fire.

Egypt alſo boaſts of producing aſſes of an extraordinary ſize, and in point of ſtrength, ſimilar to mules. In ſome of the cantons of it the ſoil is ſaid to yield melons, of Indian origin*, the taſte of which is very agreeable, and their ſize ſometimes ſo large, that two of them are ſaid to be a ſufficient load for a camel.

Among the feathered tribe there met with, we diſtinguiſh a bird which preys on fiſhes. Its body is black, but its head is covered with

" reeds *(Dis)* cables for veſſels; they alſo kindle bits of it, " which burn like a flambeau, and afterwards are extinguiſh- " ed, &c." See the manuſcript in the National Library p. 60. (L—s.)

* *Bathik hindy*, the melon of India, Angouria. The Arabians alſo call this fruit *Bathik rekky* and *Feje*, and the Turks Chamkaouny, the melon of Syria. The generic name of the melon in Arabic is *Bathik*, in Turkiſh *Kaoun*, and Perſian Korbzeh. On this fruit, conſult Forſkal's *Flora Ægyptiaco-arabica*, p. 167, chap. lxxv, cxxii, Hoeſtes's *Nachrichten von marokkos*, p. 309, Abdellatiphi *Compendium memorabilium Ægypti*, cap. ii. p. 26, of the Arabic edition of Joſeph White, and p. 87 of the German edition of M. Gunther Wahl. (L.—s.)

white

white feathers: the name of it is *Oukab-en Nil*, the eagle of the Nile.

The *Nems* (the Ichneumon), is another animal peculiar to Egypt; its ſize is ſmall, and its colour red, except the belly, which is white. It is ſaid to have a ſingular enmity to the crocodile. It avoids the ſight of large ſerpents; but, if it happen to be caught by one of thoſe reptiles, it diffuſes through its mouth an odour ſo inſupportably fetid, that the ſerpent tears itſelf to pieces in endeavouring to get rid of it.

Among the moſt wonderful and remarkable things in Egypt, are the two great pyramids (El-Heraman), ſituated on the weſtern bank of the Nile, near Foſthath.* They are built of great ſquared ſtones, and their height is three hundred and ſeventeen cubits (548 feet, 1 inch, 9 lines). Their four ſides, which gradually diminiſh in aſcending, are equal to each other, and their breadth at the baſe† is four hundred and ſixty cubits (795 feet 5 inches).

* Situated in the face of Foſthath (El-heraman el-mohadſyan lil Foſthath). M. S. in the library, p. 60.

† All the writers ancient and modern, who have deſcribed the pyramids, have varied in giving their dimenſions. The height of the great pyramid, according to *Abd-er-raſhid*, approaches nearly to that given by *Diodorus Siculus* (near ſix

The conſtruction of theſe ancient monuments, built with all the proportions neceſſary to give them ſolidity, is a maſter-piece of art, and neither winds, tempeſts, nor earthquakes, have hitherto ſhaken them.

It is aſſerted, that formerly the pyramids were covered with different ſculptures, and even that they bore inſcriptions in ancient characters, called *mouſnad* or *hemiary*.* This inſcription bore,

hundred feet), and the baſe which he here gives of one of the faces, is almoſt the ſame with that which we find in *Herodotus*, (eight hundred feet). *Note.* The men of ſcience who went on the expedition to Egypt, have determined the height of this pyramid.

* In the ancient Arabic were too principal dialects, which took their names from the moſt conſiderable tribes who uſed them.

The one was called *Arabiet Hemiar* (the Arabic of Hemiar), and the other *Arabiet Koraiſh* (the Arabic of Koraiſh).

The following is what we learn from the oriental writers, reſpecting thoſe two ancient idioms.

The dialect of *Koraiſh* is common to the Koraiſhites, the deſcendants of Iſhmael, and to the tribes ſettled in the *Hejaz*, a portion of Arabia, where we find the two celebrated cities of Mecca and *Yatſrib* (Medina). It was accounted the moſt pure language; and thus it received, by way of eminence, the name of *the clear and elegant language*. This was the dialect which Mahomet ſpoke and uſed, in all his writings.

This language was afterwards inſenſibly altered, by the mixture

"That the conſtruction of thoſe monuments at-
"teſted the power of the Egyptian nation, and

mixture of foreign words, brought by the numerous caravans which annually viſit Mecca; and at preſent it is only a jumble of different idioms, Aſiatic and African.

The dialect of *Hemiar* claims an origin much more ancient than that of *Koraiſh*; and the Arabian authors aſſure us that it was uſed in the moſt remote times, even from the period when the Arabians began to be incorporated as a nation.

It was the particular idiom of the tribes known by the name of the Hemiarites (the Ὁμηριται of Ptolomy), who inhabited a portion of Arabia the Happy, and drew their origin from *Hemiar*, the ſon of *Abd-eſh-ſhems*, one of the children of *Yachab*, and the grandſons of *Kahthan* or *Iokthan*, who is believed to have been the firſt king of Yemen. Theſe tribes were conſidered as the moſt noble and conſiderable in all Yemen. They have given kings to all the neighbouring nations, and the dynaſty of the *Iſmaelians*, who reigned in Perſia, was of Hemiarite origin. A long time before muſſulmaniſm, the Hemiarites had already conquered a part of Africa, where they had eſtabliſhed their colonies, and diffuſed their language.

The capital of the ancient Hemiarites was *Mariba*, known at the preſent day, by the name of Mareb.

According to *Aboul-feda*, the kings of the Hemiarite race reigned over Yemen, for a period of 2020 years, from Hemiar, who aſcended the throne about the year 1698, before the vulgar æra, to *Zoul Naouas*, who loſt his crown and his life ſeventy years before the birth of Mahomet (502 of the common æra), in an irruption of the Ethiopians, who ſeized upon all his dominions.

The

"that it was eaſier for men to deſtroy them, than "to erect their equals."*

The Hemiarite language was loſt in the conqueſts of Mahomet and his ſucceſſors, and no veſtige of it remains; but all hiſtorians agree, that it was very different from the Arabic language, properly ſo called; and, on this ſubject, they cite the following proverb, common in the mouths of the Arabians: "Let the Arabian who comes to *Dſafar* "(one of the principal towns of the Hemiarites), learn the "dialect of Hemiar."

The Hemiarites had not only a dialect peculiar to themſelves, but alſo their own manner of writing, the characters of which are alſo unknown to us. That writing bore the name of *Mouſnad*; and *ebn Khalikan* tells us, "that the "letters of it were diſunited, and very diſtant from each other."

It was unlawful to communicate the knowledge of it to families of the inferior claſs, or to any ſtranger, without the ſpecial permiſſion of the government.

Nevertheleſs, more than one Arabian author is ſaid to have diſcovered, and interpreted Hemiarite inſcriptions. *Aboul-feda* ſays that *Shaimer ebn Malek*, king of Yemen, cauſed to be engraved upon one of the gates of Samarkand, about the year 900 before the common æra, a Hemiarite inſcription, which ſignified, "That from Sanaa to Samar-"kand, was a thouſand parafangs."

It appears that the Hemiarite characters were already forgotten in the time of Mahomet, and that their place was ſupplied by another manner of writing, which had become common among the different tribes of Arabia.

This manner of writing was called *koufy*, from the name of the town of *Koufa*, in Meſopotamia, where it was invented,

Tradition informs us that thoſe pyramids contain ſepulchres, and that in the year 225 of Hegira of the prophet, to whom be ſalvation and benediction (839 of the common æra), there was

invented, and from whence it was brought to Mecca and Medina, by *Mazar Ebn-Morar El-Anbary*.

In the eaſt, are many monuments, on which we read cufick inſcriptions. I have obſerved them particularly on the ſoffits *(ſofites)* † of the entrances of the great moſque at Alexandria, and in ſeveral parts of the citadel of Cairo.

In ſhort, the cufick characters themſelves gave place to the Arabian writing now in uſe, which was invented by the Viſir *Ebn-Mokla*, and which has been tranſmitted to our days, without any ſenſible change.

* The following is the text and the tranſlation of this inſcription, as it ſtands in our manuſcript, p. 60:—"*Anny "benitou houma femen yeda-ay koueh fy mulk-hi fely ha de-"mou-houma feen el hadem eicer min el-bena oue kad keçoue-"nahouma beldeibaje fe men iſletha a fe-liekſou houma hel-"haſr.*"—"I built both of them: let him who wiſhes to "ſhow his power deſtroy them. It is neverheleſs eaſier to "deſtroy than to build. We covered them with a precious "robe: let any who can, cover them only with mats." Almakriſy, under the article Pyramids, cites four readings of this inſcription, the ſubſtance of which is always the ſame. (L—s.)

† *Soffita, Saffita*, or Soffit, ſignifies, in ordinary buildings, the board over the top of a window; in great edifices, the ceiling of an appartment, formed by croſs beams, or flying cornices, and having the ſquare pannels of its compartments enriched with ſculpture, &c. See Neve's Builder's Dictionary. *Tranſlator.*

found

found in them a book, written in unknown characters, of which, however, an old man of the Chriſtian monaſtery of Kalmoun accompliſhed a tranſlation.

That book made mention of celeſtial obſervations, made for the conſtruction of the pyramids, and obſervations ſtill more ancient, according to which, by comparing the different relations of the heavens to the earth, a prediction had been diſcovered, importing, that the earth would one day be entirely overwhelmed and deſtroyed.....*

" In conſequence of this prediction, a king of " Egypt, named *Sourid*, the ſon of *Salhouk*, re- " ſolved to have a tomb erected for himſelf, and " two others for the reſt of his family. He choſe " for his own tomb, the pyramid ſituated the " moſt eaſterly. That which ſtands towards the " weſt, was deſigned to contain the tomb of his " brother, and his nephews were to have their " ſepulchre in the third....."

* Our manuſcript gives a very different ſenſe. The following is a tranſlation of it: it is always the text of the ancient Egyptian book. " We have inſcribed upon the " walls (of the great pyramid) the calamity which is to " deſcend from heaven on the four points of the world, and " that when the heart of Leo ſhall paſs into the firſt " minute of the head of Cancer; and ſuch will be the ſi- " tuation of the planets in the heavens, the ſun and the moon " being in the firſt minute of Aries, &c."

Celeſtial

" Celeſtial obſervations had been made at " the firſt minute of the ſun's entry into the " heart of Leo, approaching to the head of Can- " cer, all the other ſtars entering into that ſign; " the ſun and the moon in the firſt minute of " Aries; *Refan* * (Saturn) in the twenty-eighth " degree, one minute of the ſame ſign; *Melokh* " (Mars) in the twenty-ninth degree, three mi- " nutes of Piſces; *Venus at the twenty-eighth de-* " *gree; Mercury at the twenth-ſeventh degree of* " *the ſame ſign* † *and Pikheus* (Jupiter) in Li- " bra....."

" Sourid

Our manuſcript makes no mention of an inundation. In it we read that " the aſtronomers having predicted, that " a calamity (*aſet*)) proceeding from heaven and earth, " ſhould deſtroy the plants and animals of the earth, they " adviſed Sourid Ben Salouk to have a tomb built for him " and his family. For this reaſon, the eaſtern pyramid was " conſtructed for him, the weſtern for his brother, and for " his nephew that which had a covering, &c." (L—s.)

* Refan (Ρηφαν), Melokh (Μελοχ), and Pikheus (Πιχηυς), are the names which the ancient Egyptians gave to the planets, Saturn, Mars and Jupiter. The Arabians called them by the names of Zohel, Merrikh and Mouchtery.

† I have interpolated the paſſage in Italicks, from the M.S. in the National Library. I may add, that theſe aſtronomical obſervations are more extenſive and detailed, in the work of Al-Makriſy. They are to be found at large in my Memoir on the Pyramids. (L—s)

"Sourid, after his death, was interred, ac-
" cording to his orders, in the eaſtern pyramid,
" his brother in the weſtern pyramid, and Kou-
" ros* his nephew, in the third pyramid."

" The entrance into thoſe pyramids was by a
" ſubterraneous edifice †, the length of which
" was one hundred and fifty cubits (259 feet, 4
" inches, 6 lines). The portico of the eaſtern py-
" ramid was ſituated towards the eaſt, and that of
" the weſtern towards the weſt: the entrance of
" the third, which was called Mouzet ‡, was
" directed towards the north. Thoſe monuments
" were believed to contain immenſe riches....."*

This fragment was tranſlated from the *Coptic*, or ancient Egyptian language into Arabic. And ſince the aſtronomical epochs; recorded in this book, have been examined and compared, it has been found, that from the foundation of the py-

* Koroures, according to our manuſcript. L—s.)

† Ezeje, an arched ſubterraneous gallery. (L—s.)

‡ Mouzer does not appear to me a particular denomination. But I believe that it ſhould be pronounced *Mouezzer* (the two words are written alike), and tranſlated, the pyramid covered with a garment. This pyramid, which our author ſays is the leaſt, is probably overlaid with marble. See the inſcription which I have above inſerted, page 400. (L—s)

ramids

ramids, there have elapſed 4331 years. It was then enquired, What number of years hade lapſed from the *Thoufan* (the deluge), and this period was found to be 3941 years. Thus this book informs us, that the pyramids were conſtructed 390 years before the deluge; but the truth of this is only known to God and his prophet.

One of the wonderful things in Egypt is the ſtatue named Aboyl-houla* (the ſphinx). This monument, which repreſents the image of a human head, is ſituated near the pyramids, where it appears half out of the ground. It ſerves as a taliſman againſt the ſands, to hinder them from penetrating into the country of Jizeh.

There is alſo in Egypt a remarkable fountain, bearing the name of Nathoul. Its ſource is in a deep cavern, from the roof of which it falls in drops like rain, and carries along with it a ſlime, which adhering to its ſides, is there inſpiſſated, and produces rats, mice, and other impure animals.

Mount Mokatham extends along Egypt, from Soueys (Suez), and runs parallel to the courſe of

* Abou-el-houl (the Father of Terror) on account of the monſtrous figure of that coloſſus. It was anciently called Belhit, according to Al-Makriſy, who gives no explanation of this name. (L—s.)

the Nile as far as the country of the Ethiopians*. It produces neither plants nor trees, nor potable water, except from a little fountain, rather bitter and brackiſh, at a chriſtian monaſtery.

It has been pretended, that this mountain formerly contained a mine of emeralds. At preſent are found there a great number of mummies, or dead bodies dried and preſerved in the ſand, like thoſe which are taken out of the wells of *Sakarah* †, in the plain of the pyramids.

* Our manuſcript adds, "That it commands the mountain Karafah, (near to Cairo, and famous for its obſervatory) and that moſques and chapels have been built on its ſummit." (L—s.)

† Read Sakharah, that is to ſay, the rock. In fact, the bottom of this plain is a rock covered with ſome feet of ſand. See the *Deſcription of the Plains of Heliopolis and Memphis, by Fourmont*, p. 220. This laſt member of the phraſe is not in our manuſcript. I conjecture, that it has been added by citizen Marcel, to give greater perſpicuity to his tranſlation. (L—s.)

DISCOURSE

DISCOURSE

Of CITIZEN DENON,

To be read at the Inſtitute of Cairo, on his Return from Upper Egypt.

Citizen Preſident,

YOU have told me, that the Inſtitute expected me to give an account of my journey into Upper Egypt, by reading to them, at their different meetings, the journal which I ſhould have joined to the drawings which I have brought with me. The earneſt deſire I feel to fulfil the requeſt of the Inſtitute, will induce me to haſten the arrangement of the notes which I took, with no other pretenſion than that of not neglecting any object that was daily preſented to my curioſity, thinking that every thing was curious in a country altogether new to Europe: and that, at my return, every one would be aſking me for ſome account of the object of his perſonal curioſity. I had in view objects of every kind; and if I am afraid, in this place, of tiring thoſe to whom I ſhew the number of my productions, becauſe I exhibit to them things which they have daily

under their eyes; when arrived in France, I ſhall perhaps, reproach myſelf for not having multiplied them ſtill more, or rather I ſhall regret, that circumſtances allowed me neither ſufficient time nor opportunity. If my zeal has put into action all my reſources, they have been ſeconded and ſupported with all the aſſiſtance which I could expect from the Commander in Chief, whoſe vaſt conceptions do not make him forget details. Knowing that the object of my journey was to viſit the monuments of Upper Egypt, he ſent me with the diviſion appointed to make the conqueſt of it. In General Deſaix, I found a man learned, curious, and friendly to the arts. I received from him all the civilities which circumſtances would permit. With General Beliard I experienced equality, friendſhip, and unaltered attention; good nature on the part of the officers; and a cordial wiſh to oblige, in all the ſoldiers of the twenty-firſt demi-brigade. In ſhort, I ſo identified myſelf with the battalion which it formed, and which was become my ordinary abode, that I forgot I was on a warlike expedition, or that war was foreign to my occupations.

Having to purſue an enemy always on horſeback, the movements of the diviſion were numerous

merous and unforeſeen. Forced to paſs rapidly the moſt intereſting monuments, and to ſtop where there was nothing worthy of obſervation; if, in my nullity, I ſometimes felt the fatigue of unprofitable marches, I alſo experienced that it is frequently advantageous to take a firſt glance of great objects, before detailing them; that dazzled by their number, they may not claſs themſelves in the mind by mere reflection; that, if we muſt carefully preſerve the firſt impreſſions, it is only in the abſence of the objects which firſt gave them birth, that we can analyze them, judge of them, adopt them. I have alſo thought, that a travelling artiſt, when entering on a journey, ought to leave behind him all partiality to his profeſſion; that it is not that which would make a fine drawing, which ought to occupy him, but that curioſity ſhould inſpire the aſpect of the place which he has to delineate. I have already received my recompenſe for abandoning this partiality, in the complaiſant curioſity which you, Citizen, have manifeſted to obſerve with avidity, even the leaſt among the immenſe number of deſigns which I have brought hither, deſigns which I moſt commonly ſketched upon my knee, in a ſtanding poſture, and even on horſe-

back; having never been able to finish a single one to my mind, nor once, for a whole year, to procure a table sufficiently plain to allow me the use of a ruler.

It was, therefore, with a view to answer your questions, that I sketched this multitude of designs, frequently on too small a scale, because our marches were too precipitate to attempt the details of objects, of which it was my wish to present you, both with a just and general view. In this manner, I took in a mass the pyramids of Sakhourah, the situation of which I traversed at full gallop, in my way to Beneçouef, in the mud houses of which I remained for a month. This time I employed in comparing the characters, and in designing the figures and the dress, of the different nations who now inhabit Egypt; their manufactures, and the relative situations of their villages.

At last I saw the portico of Hermopolis; and the great masses of its ruins, gave me the first image of the colossal Egyptian architecture. Every rock which composed this edifice appeared, in my eye, as if inscribed POSTERITY, ETERNITY.

Soon after Denderah *(Tentyris)*, taught me, that

that it is not in the Doric, Ionic, and Corinthian orders alone, that we muſt ſeek the beauties of architecture; and that beauty exiſts wherever harmony of parts is found. The morning brought me to its edifices, and the evening tore me from them, rather agitated than ſatisfied. I ſaw a hundred things, while a thouſand eſcaped me. I was, for the firſt time, introduced to the archives of the arts and ſciences. I had a preſentiment that I ſhould ſee nothing more beautiful in Egypt; and twenty journeys, which I have made to Denderah, have only confirmed me in this opinion. The arts and ſciences, united by good taſte, have decorated the temple of Iſis. Aſtronomy, morality, and metaphyſics, have here bodily forms, which decorate the ceilings, the frizes, and the pedeſtals, with as much taſte and grace, as our poor, inſignificant Arabeſc imitations give to our cloſets.

We continually advanced. I will confeſs that a thouſand times I dreaded that Mourad, tired of fleeing before us, would ſurrender himſelf, or hazard a deciſive battle. I thought that that of Samhout would give him the finiſhing blow; but inſtead of fighting us, he thought that the deſert would be more fatal to us than his arms;

and an opportunity of deſtroying him ſtill eluded Deſaix, while I entertained the hope of purſuing him beyond the tropic.

We approached *Thebes*—Thebes, the very name of which excites the recollection of great ideas. As if it had been poſſible that it could eſcape me, I delineated it at as great a diſtance as I could perceive it; and as I made this deſign, I indulged the hope, that you would one day participate the ſentiment by which I was animated. We were obliged to traverſe it rapidly, and ſcarcely had I viewed it a moment, when I was forced to quit it.

There was a coloſſus which could only be meaſured by the eye, and by the aſtoniſhment which it occaſioned. On the right were embowelled and ſculptured mountains; on the left, temples, which, at more than a league's diſtance, appeared like other rocks; and palaces, like other temples, from which I was ſnatched. I turned round mechanically to ſeek for the hundred gates, a poetic expreſſion, by which Homer intended to paint, in a ſingle word, this ſuperb city, loading the earth with the weight of its porticoes, and ſo large, that Egypt could ſcarcely contain its extent. Seven journeys have not ſatisfied the curioſity

curioſity excited by the firſt; and it was not before the fourth, that I reached the other bank of the river.

Farther on, *Hermontis* would have appeared ſuperb, if I had not found it almoſt at the gates of Thebes.

The temple of *Eſné*, the ancient *Latopolis*, appeared to me the perfection of Egyptian art, one of the fineſt productions of antiquity. That of *Edfou*, or *Apollinopolis magna*, is one of the largeſt, beſt preſerved, and beſt ſituated of all the Egyptian monuments. In its preſent ſtate, it appeared like a fortreſs commanding the town.

There the deſtiny of my journey was decided, and we proceeded irrevocably on our way to Syene (Eçouan). In traverſing thoſe deſerts, I, for the firſt time, became ſenſible of the weight of years, which I had not reckoned, when I engaged in this expedition: my courage, rather than my ſtrength carried me through. There I quitted the army, to remain with the demi-brigade which was poſted to confine Mourad to the deſert. Proud of finding my country poſſeſs the ſame boundary with the Roman empire, I occupied with glory the ſame quarters, with the three cohorts which had formerly defended it. During the

the two and twenty days that I remained in this celebrated ſtation, I took poſſeſſion of all the environs. I puſhed my conqueſts even into Nubia, beyond *Philé*, a delightful iſland, the curioſities of which muſt ſtill be ſnatched from the ſavage inhabitants. Six days march, and five days of ſiege, at laſt opened to me its temples. Feeling all the importance of deſcribing to you the place which I now inhabited, all the curioſities which it contained, and which it would yield to you, I delineated even the rocks and quarries of granite, from whence proceeded thoſe coloſſal figures, thoſe obeliſks ſtill more coloſſal, thoſe rocks covered with hieroglyphics. It was my wiſh to give you the forms, and the very patterns of every thing intereſting, which I ſaw. Not being able to give a chart of the country, I made a bird's eye ſketch of the entry of the Nile into Egypt, and took views of that river rolling its waters, among pointed rocks of granite, which ſeem to have marked the limits of the burning Ethiopia, and of a country more happy, and more temperate. Leaving for ever thoſe rugged countries, I returned towards the verdant Elephantina, the garden of the tropic. I ſearched, I meaſured all the monuments preſerved in it, and

and I quitted with regret that peaceful retreat, where agreeable occupations had reſtored me to health and ſtrength.

On the right bank of the Nile, I found *Ombos*, the town of the crocodile, and that of Juno Lucina, *Coptos*, near to which I was under the neceſſity of defending the riches which I was bringing away, from the atrocious fanaticiſm of the Mekyns.

When fixed at *Kené*, I went with thoſe who croſſed the deſert to *Koſſeir*, in order to put a ſtop to new emigrations from Arabia. I ſaw what may be called a breach of the chain of Mokatham, the ſterile borders of the red ſea. I became acquainted with, and reſpected that patient animal, which nature ſeems to have placed in this region, as a reparation for her error in making a deſert. I then returned to Kené, from whence I ſucceſſively reviſited Edfou, Eſné, Hermontis, Thebes, Dendera; and Edfou and Thebes again. In ſhort, I accompanied every party which was detached, in every direction: and, if the love of antiquity often made me a ſoldier, the reſpect of the ſoldiers for my reſearches, often made them antiquaries. In theſe laſt excurſions,

I viſited

I viſited the tombs of the kings; and in thoſe myſterious depoſitories, I acquired an idea of the art of painting among the Egyptians, of their arms, their furniture, their utenſils, their inſtruments of muſic, their ceremonies, and their triumphs. In theſe laſt journeys too, I came to be convinced, that hieroglyphics engraved upon walls were not the only books of that learned people. After having found in *baſo-relievo*, perſons in the act of writing, I additionally diſcovered that roll of *papirus*, that extraordinary manuſcript, which hath already been made the object of your curioſity: frail rival of the pyramids, precious pledge of a preſervative climate, monument reſpected by time, and which forty centuries place in the rank of the moſt ancient of books!

In theſe laſt excurſions, I endeavoured by my reſearches, to complete the voluminous collection of hieroglyphic drawings. It was in thinking of you, Citizen, and all the learned in Europe, that I found courage to copy, with ſcrupulous exactneſs, the minute details of dry figures of which I did not underſtand the ſenſe, and could not avail myſelf of the aſſiſtance of your learning.

At

At my return, Citizen, loaded with my labours, the weight of which was daily increasing, I forgot the fatigue of them, when I reflected that they were performed under your eye, helped forward by your advice, and that I might one day render them useful to my country, and not unworthy of being laid before you.

FINIS.

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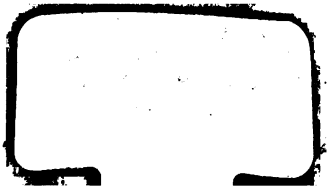
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